FOUNDRY TRADE JOURNAL

EST. 1902

WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

VOL. III
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AUGUST 31, 1961
Offices: John Adam House, John Adam St., London, W.C.2

Single Copy 1/-. By Post 1/4. Annual Subscription, Home 52/-, Abroad 60/- (Prepaid)

THE NEW TACCONE HYDRA-PNEUMATIC MOULDING MACHINE

- LONG LIFE, FLEXIBLE COMPENSATING PAD (DIAPHRAGM)
- MOULD HARDNESSES UP TO 100 (DIETERT)
- PRODUCTION UP TO 300/500 MOULDS PER HOUR
- PRECISION PATTERN DRAW
- NO JOLT OR VIBRATION
- DEEP, NARROW POCKETS OF UNIFORM HARDNESS (100 DIETERT)
- QUICK CHANGE PATTERN MECHANISM

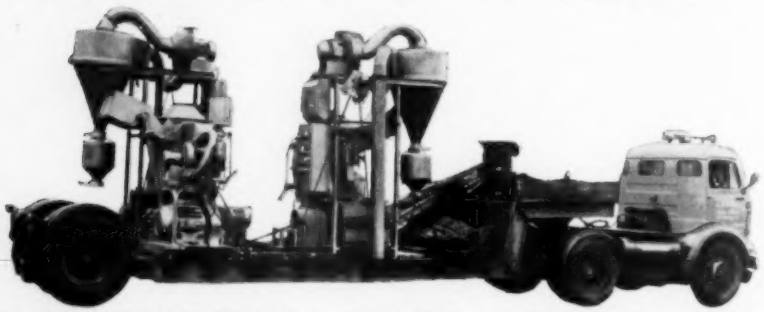
Baker Perkins Ltd.

Foundry Department,
Bedewell Division, Hebburn on Tyne.
Telephone No: Jarrow 897124

TWO MORE FORDATH COMPACT COATERS

Such was the reception of the new 150 Compact Coater at the Milan Foundry Exhibition last October, that even our highest hopes were surpassed.

Orders from Italy and elsewhere on the continent for this new "packaged deal" have proved conclusively that FORDATH have brought Shell Sand Coating within the reach of the smaller user, for Shell Mould and Shell Core operations. This new Coater can provide 2 tons of resin coated sand per 8 hour shift in 150 lb. batches. The unit is completely self-contained with integral electric heater, control panel with time-cycle selection and pneumatic sand loader, the only requirement at installation is the connection of air and electric power lines.



EN ROUTE TO ITALY

FORDATH

For further details write to: The Fordath Engineering Co. Limited., Brandon Way, West Bromwich, Staffs, England. Telephone: West Bromwich 1665 (4 lines). Telegrams: Fordath Telex West Bromwich. Telex No.: 33415.

Bastable

JACKMAN — BUILT

OSBORN JOLT ROCK-OVER PATTERN DRAW MACHINES

OSBORN ROTO-CORE AUTOMATIC 5 STATION CORE BLOWER

PRODUCTION UP TO 360 CORES AN HOUR WITH TWO OPERATORS

EASY TO SET UP CHANGE OVER TIME 3 MINUTES. PERMITS SHORT RUNS TO BE MADE ECONOMICALLY.

SIMPLE TO OPERATE QUALITY IS UNIFORM. COST PER CORE MINIMUM.

PRODUCTION IS STEADY MAKES 5 DIFFERENT CORES WHEN USING COPE HANDLER. COPE HANDLER CARRIES AND POSITIONS COPE HALF OF EACH BOX.

PRE-SET TIME CYCLE ENSURES OUTPUT RATE

FOR FULL DETAILS WRITE TO

J. W. JACKMAN & COMPANY LIMITED

VULCAN WORKS, BLACKFRIARS ROAD, MANCHESTER, 3

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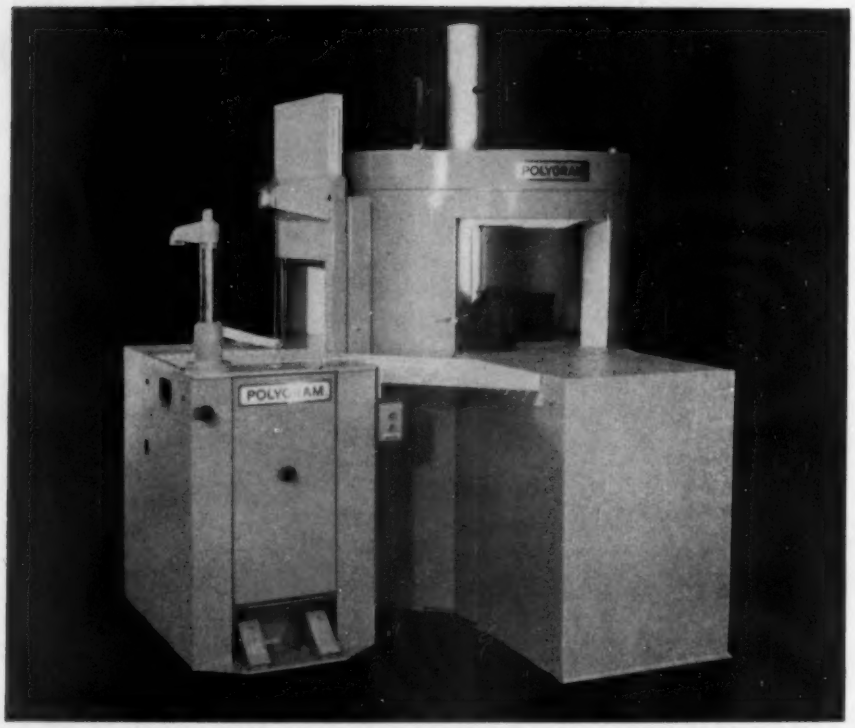
A

The POLYGRAM 8*

CMU SHELL COREMAKER

for Jobbing Foundries



Designed to bring all the economic and technical advantages of shell cores into *your* foundry, the latest Polygram CMU Shell Coremaker is the fruit of 12-years of continuous research by the only British Specialists in Shell Moulding and Coremaking. Note that the unit construction enables you to fit a CMU core blower or oven into your existing layout and to expand it into a full CMU Shell Coremaker at *your* convenience.

8* *Features of the Polygram CMU Shell Coremaker*

- Maximum Versatility
- Maximum Complexity-of-Core
- Minimum Handling
- Minimum Maintenance
- Maximum Quality
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- Minimum Skill
- Minimum Heat

Designed by Foundrymen—Built by Engineers

Write **NOW** for details to:

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THE FIRST NAME IN SHELL MOULDING

SHERNFOLD PARK · FRANT · TUNBRIDGE WELLS · ENGLAND. *Telephone:* Frant 346.

Serving the foundrymen of tomorrow—today

More and more foundries are switching to our plastic pattern letters. It's easy to see why: they're cheaper by half, they stand up to hammer blows, they come away clean and leave a perfect impression and you can fix them with nails or adhesive. Now we're making smaller sizes—⅜ in. right down to ¼ in.—and we're giving them sharp faces to maintain the clear impression. (The larger sizes still have the standard flat face with all its special advantages). Let us send you a handful of assorted sizes and a price list—they'll tell you everything you want to know about plastic pattern letters—including why so many foundries use them.

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Redhouse Industrial Estate, Aldridge, Staffordshire. Tel. Aldridge 52031.
Sales Offices: 33 Grosvenor Place, London, S.W.1. Telephone: BELgravia 1234
92 Oxford Road, Manchester 13. Telephone: ARDwick 4118

TA/AP5

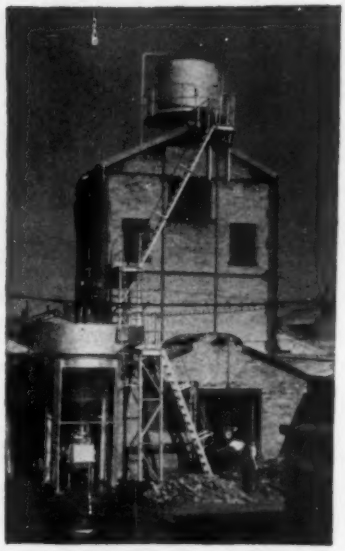
Coarse as grit . . .
fine as fume;

dust

If you want to control it, collect it, separate it, extract it, the people to get in touch with are Filter-Heat Ltd.

WHY?

For a very sound reason. They are not committed to any particular method of dust collection but are concerned with one thing only – the best way to trap a particular type of particle. It might be done with cyclones, cloth filters, wet collectors – or a combination of these. Filter-Heat makes them all. On a cupola, for example, they would recommend a water screen grit and spark arrester. The one illustrated here removes between five and six times as much grit and dust as the dry arrester it replaced. It also removes a considerable proportion of the sulphur in the gases. If you have a dust or grit problem; ring Leigh Lancs 72101 – or (in London) Abbey 3085. Filter-Heat take over from there.



Cupola at Willenhall equipped with a Filter-Heat grit and spark arrester – at Monmer Foundry Limited in St. Annes Rd.

FILTER-HEAT LTD

(a subsidiary of Sutcliffe, Speakman & Co. Ltd)

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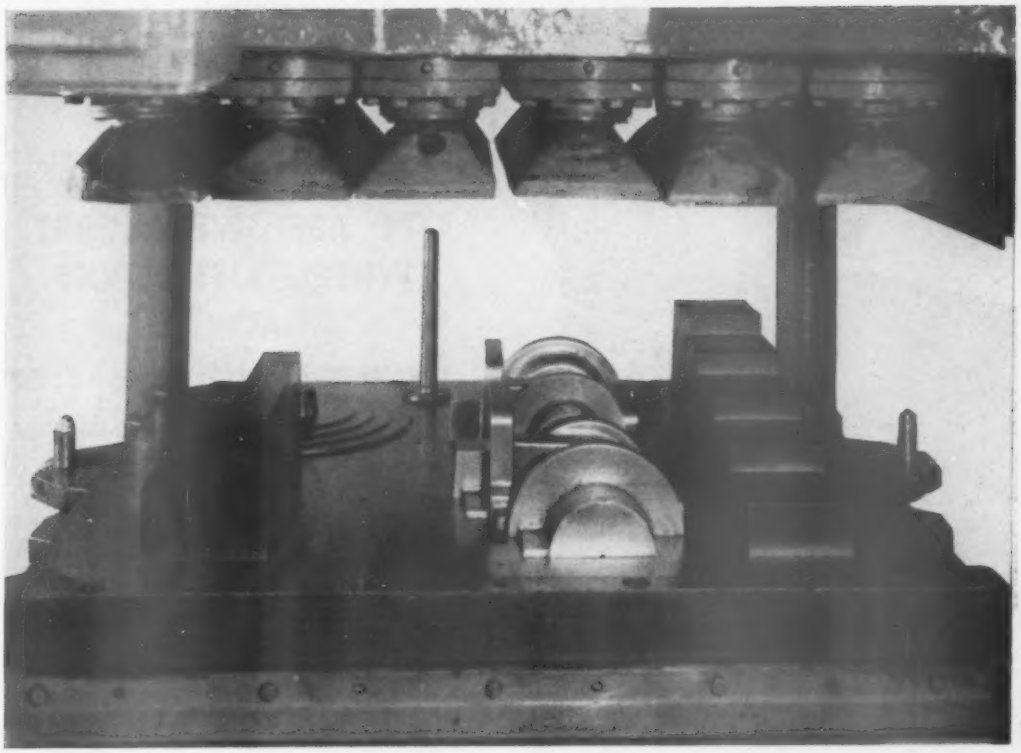

THE

HERMAN

Moldmaster

(PATENTED)

A high pressure hydraulic squeeze machine . . . *with self contouring head* . . . . . .

Built in England by

PNEULEC LIMITED, SMETHWICK, Nr. BIRMINGHAM

ROWLAND

16"–20" CO4 TYPE ABRASIVE FOUNDRY WHEEL CUTTING OFF MACHINE

- ★ UNIVERSAL IN CHARACTER
- ★ EXCEPTIONAL RIGIDITY
- ★ EXTREME SIMPLICITY
- ★ 10, 20 OR 30 H.P. MOTORS AVAILABLE
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- ★ EARLY DELIVERY

This entirely new machine is the culmination of many years experience in this field. Designed expressly for foundry use, risers and gates of up to 3in dia. on a wide variety of castings can be cut off neatly in astonishing times.

Why not consult us, we may be able to help you.

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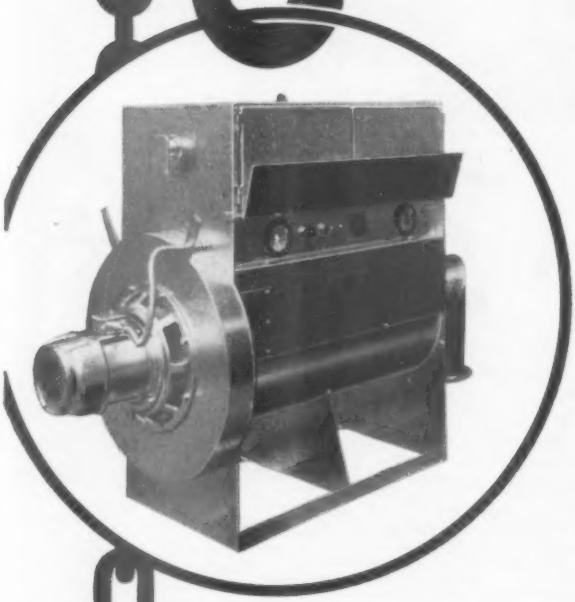
REDDISH NR. STOCKPORT
Tel.: HEA 3201

Sole Export Agents: MESSRS. D. A. (SALES) LTD. HALIFAX HOUSE, STRAND, W.C.2.
TEL.: TRA 7229

BROWN BOVERI

PORTABLE ELECTRIC MOULD DRIERS



. . . designed for drying floor moulds or large box moulds for ferrous and non-ferrous metal castings. They operate by forcing hot air over the mould surface and through the sand giving quicker and more efficient drying than is normally achieved by other methods. Using air temperatures lower than hot gases, and less than one third the quantity of heat, they reduce drying times by half. Heating is uniform throughout the mould and despite rapid drying, surfaces remain free from cracks and cleaner castings are produced.

* Driers need no attention during operation.
* Power input is regulated automatically.
* Working conditions are improved by elimination of smoke and burning gases.

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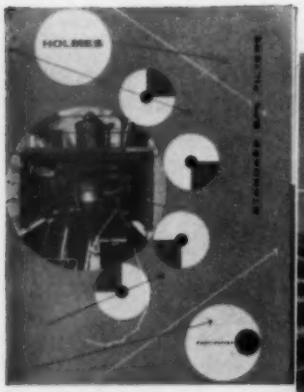
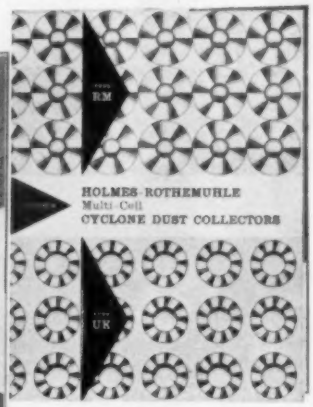
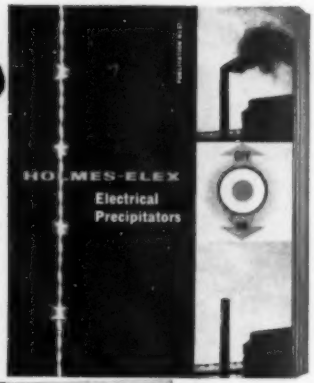


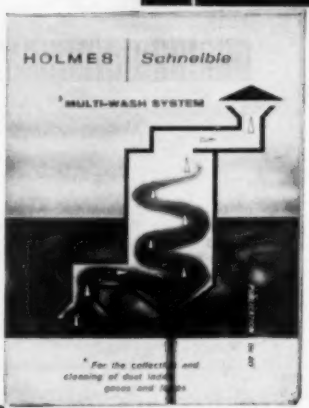


Which?



Which type of dust collection and control plant is most suitable, both technically and economically, for your particular application? A complete answer to this question lies within the pages of the various brochures illustrated. Have these brochures before you when you decide.

Ask for technical literature GCD/23



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A Member of the B.H.D. Engineers Limited Group of Companies.

Gas Cleaning Division
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C101-1

FOCUS ON 'FULBOND'

N°4 Plasticity

Many moulding sands have little plasticity even before use, and with most natural sands progressively less after each casting cycle. This is partly due to the presence of coal dust, ash and build-up of fines from dehydrated clay.

The importance of plasticity is only too obvious when the moulding sand reaches a stage which may be described as 'brittle'. Good plasticity is essential for deep draws and clean pattern stripping in all types of foundries.

Additions of new sand effect some improvement in plasticity. This is only temporary, however, because the clay constituent is contaminated with low fusible minerals.

High plasticity is one of the striking characteristics of Fulbond. This is partly due to its complex crystal structure and partly to its action in water. Regular additions of Fulbond to natural sands soon improve plasticity, texture and general workability. Many jobbing foundries find Fulbond indispensable for regenerating floor sand and increasing plasticity to suit deep vertical draws and intricate moulds.

Good plasticity is one of the advantages that synthetic sand users have over natural sand users, but it is fully appreciated that synthetic sand can only be used when it fits the practice and where suitable equipment for processing is available.

For a copy of this Brochure please write to:

THE FULLERS' EARTH UNION LTD

Patteson Court, Nutfield Road, Redhill, Surrey

A member of The Laporte Group

CMF59

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BLACKING or PLUMBAGO MIXTURE for the CO_2 process

STEELMOL *for STEEL and SPECIAL IRON CASTINGS*

SYNTHETIC GRAPHITE

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PLUMBAGO
AND "ALUMISH" FOR ALUMINIUM
Non-Silica PARTING POWDER

JAMES DURRANS & SONS LTD

PHŒNIX WORKS & PLUMPTON MILLS PENISTONE near SHEFFIELD
Telephone : PENISTONE 3121 and 3122 *Telegrams :* BLACKING, PENISTONE

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NEW FORD

CONSUL CLASSIC

CRANKSHAFT

cast in FESLENTE

RESIN-COATED SAND

Write for Technical Bulletin No. 10

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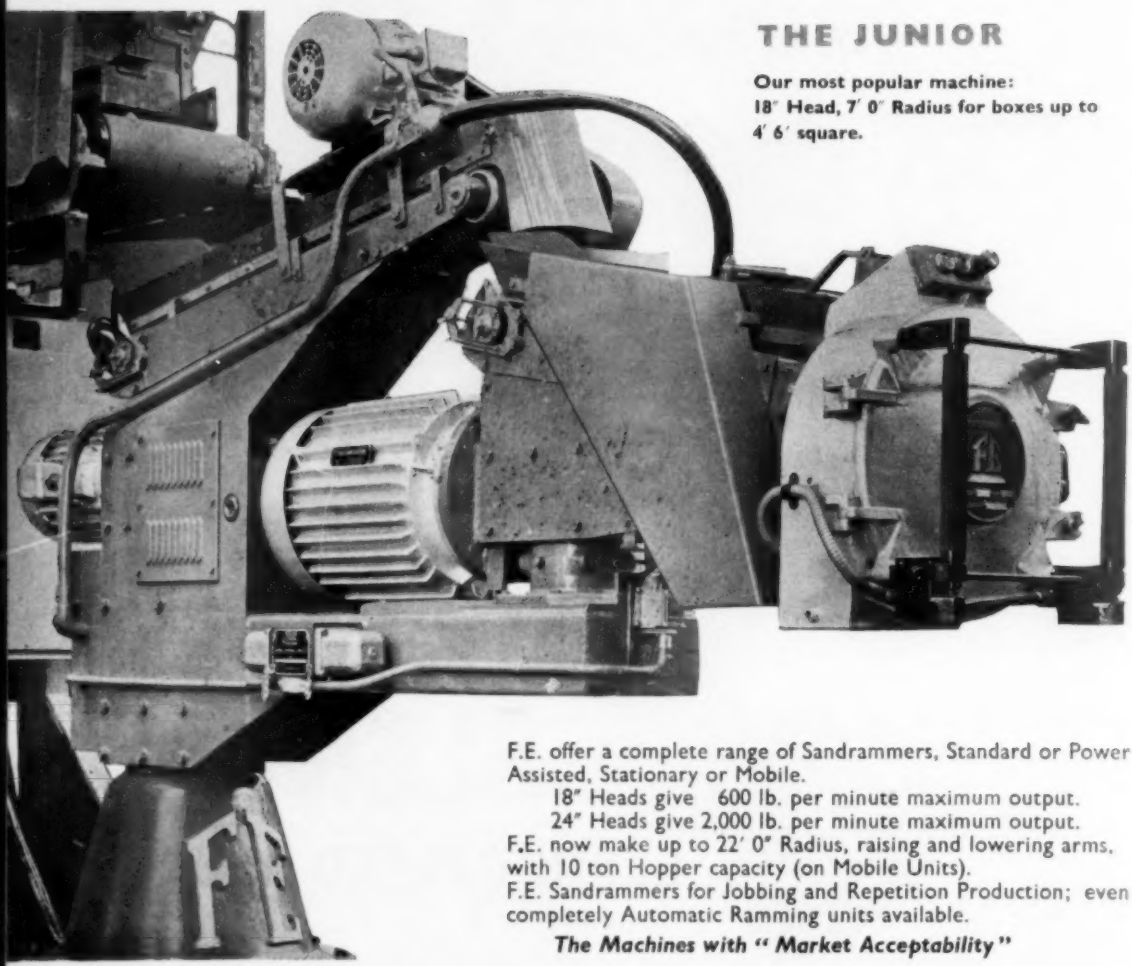


THE JUNIOR

Our most popular machine:
18" Head, 7' 0" Radius for boxes up to 4' 6' square.

F.E. offer a complete range of Sandrammers, Standard or Power Assisted, Stationary or Mobile.

18" Heads give 600 lb. per minute maximum output.
24" Heads give 2,000 lb. per minute maximum output.

F.E. now make up to 22' 0" Radius, raising and lowering arms, with 10 ton Hopper capacity (on Mobile Units).

F.E. Sandrammers for Jobbing and Repetition Production; even completely Automatic Ramming units available.

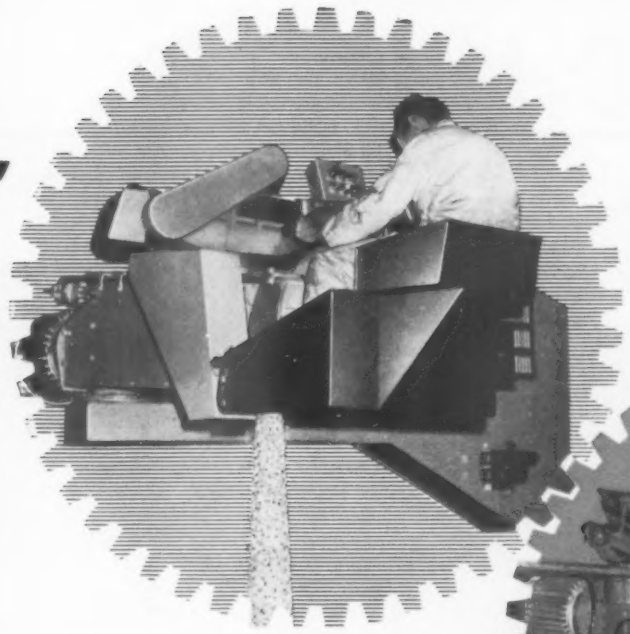
The Machines with "Market Acceptability"

FOUNDRY EQUIPMENT

LIMITED

Leighton Buzzard, Bedfordshire, England

Telephone: Leighton Buzzard 2441 (5 lines) Telegrams: 'Equipment,' Leighton Buzzard, England

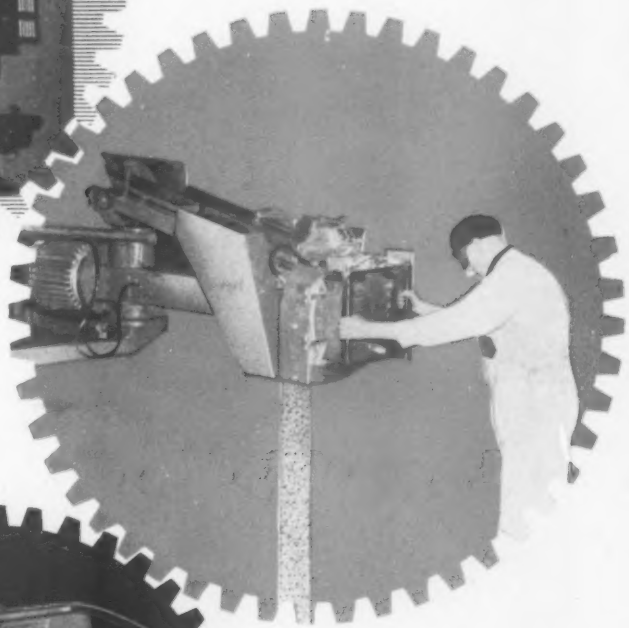


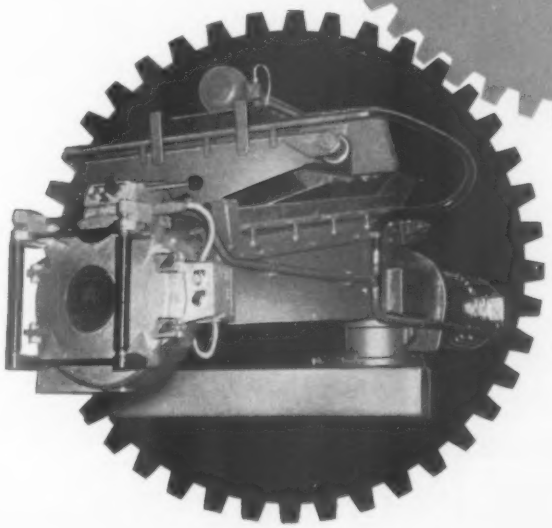
SENIOR No. 4

This is High Output Mobile Sandrammer, but Stationary model available: 24″ Head, 15′ 0″ Radius for boxes up to 10′ 0″ square.

SENIOR No. 1

The middle size machine, most suitable for jobbing work: 18″ Head, 10′ 0″ Radius for boxes up to 6′ 6″ square.





SENIOR No. 2A

Stationary Remote Control model for intermittent production of large boxes: 18″ Head, 15′ 0″ Radius for boxes up to 10′ 0″ square.

Only F.E. Sandrammers are fitted with World Patented Multi-Blade Impellors — for more powerful direct sand throw with better balanced performance.

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FOR
FOUNDRY EFFICIENCY

THE SYMBOL OF SERVICE

FROM SAND MILL TO . . .

with

- **NO BAKING WHATSOEVER**
- **NO HEATING OF BOXES**
- **NO SPECIAL PLANT**

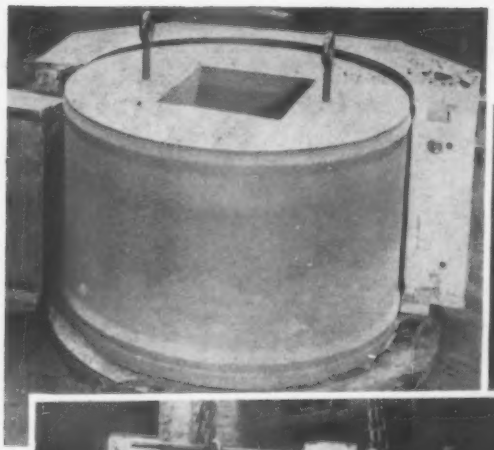
AND VIRTUAL ELIMINATION OF FUMES DURING AND AFTER CASTING

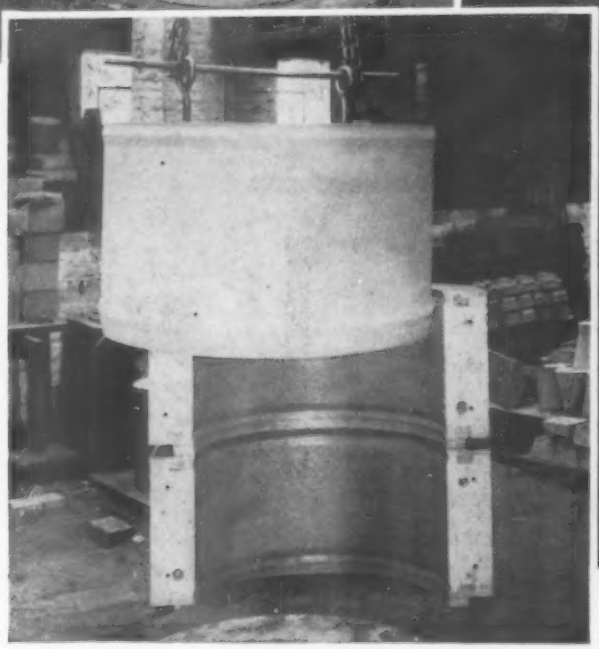
MANUFACTURED IN LONDON BY

- **SAMPLES AND FULL PARTICULARS GLADLY SUPPLIED ON REQUEST**

. . METAL in 80 minutes

SUPINOL NO-BAKE CORE BINDERS





● WEIGHT OF CORE 1018 lb.

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FACTORY: CONCORDIA WORKS · LONDON · E.14

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STANTON AND STAVELEY low phosphorus foundry pig iron

This iron is machine cast and customers special requirements can be met within the limits of analysis shown.

It is particularly suitable for the Automobile Industry and for all High Quality Castings.

ANALYSIS		
	Total Carbon	3·4% min.
	Silicon	2·0—4·5% (in ranges of ·5%)
	Manganese	0·7—1·1%
	Sulphur	0·05% max.
	Phosphorus	0.25 % max.

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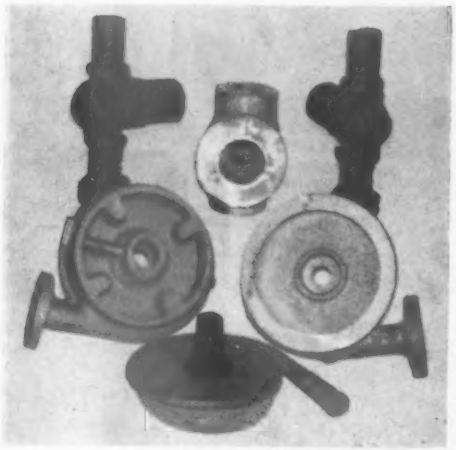
A free and confidential metallurgical service is offered to customers in all aspects of foundry practice and technique.

STANTON AND STAVELEY SALES LIMITED NEAR NOTTINGHAM

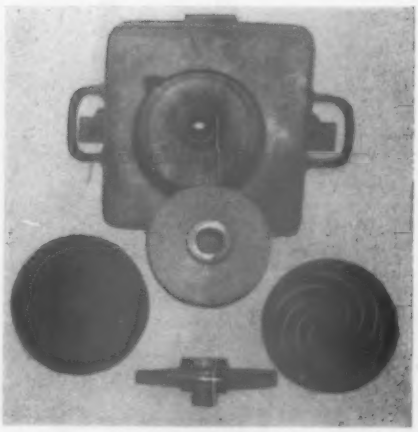
JUST A SMALL FOUNDRY



BUT—

IN THESE DAYS OF BIG BUSINESS CONSORTIUMS, TAKE-OVERS INVOLVING HUGE SUMS AND CARTELS WITH VAST RAMIFICATIONS, THE SMALL FOUNDRYMAN CANNOT AFFORD TO IGNORE MODERN METHODS. AFTER ALL, HE MAY BE STARTING AN EMPIRE!
THAT IS WHY WE AT HARBOROUGH GIVE OF OUR BEST WHATEVER THE SIZE OF OUR CUSTOMER'S BUSINESS.

ILLUSTRATED ARE SOME OF THE PRODUCTS CAST BY THE NEVILLE FOUNDRY OF SLEAFORD, LINCS. A SMALL BUT PROGRESSIVE MODERN FOUNDRY STAFFED BY MEN WHO KNOW WHAT THEY WANT—AND GET IT—THE BEST.



HARBOND and GASBOND

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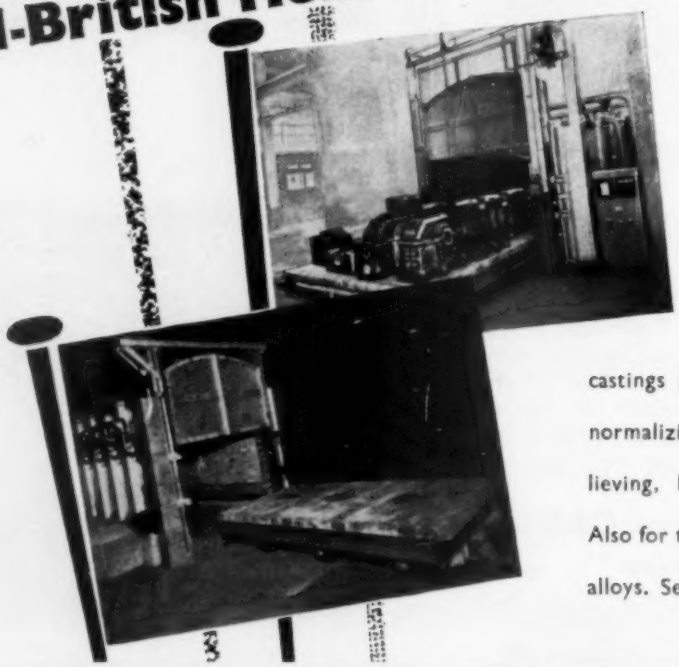
HARMARK
FOUNDRY SUPPLIES

Manufactured by

HARBOROUGH CONSTRUCTION CO·LTD·MARKET HARBOROUGH

All-British Heat Treatment Furnaces



'NEWSTAD' heat treatment furnaces are ahead in design and performance. Suitable for S. G. Irons, and for the treatment of steel castings and forgings. Furnaces for normalizing, annealing, stress relieving, hardening and tempering. Also for the heat treatment of light alloys. Send for further information.

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Builders of INDUSTRIAL FURNACES

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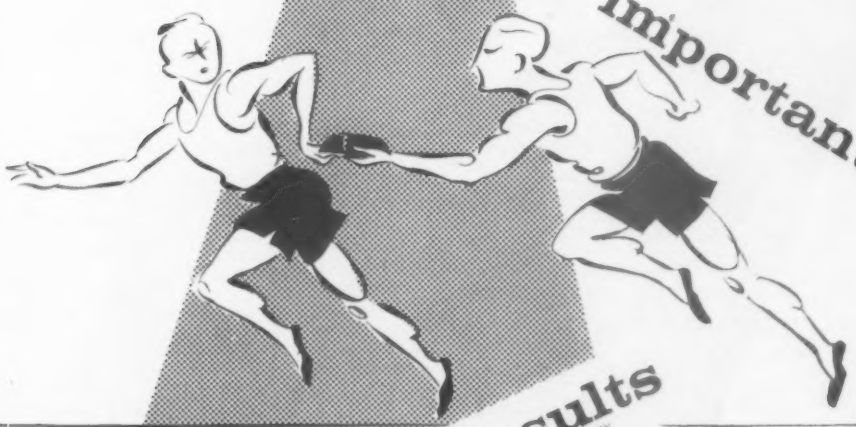
when delivery time is important



ROYD for results

The SHEFFIELD SMELTING Company Limited

HEAD OFFICE AND WORKS: ROYDS MILL STREET, SHEFFIELD, 4.

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Core and Mould Dressing

Prepared especially for
the CO_2 Process from selected graphites
and other materials

● Easy to mix and apply ● Good flash drying ● Prevents metal penetration and burn ● Reduces fettling to a minimum ● Suitable for ferrous and non-ferrous metals ● Economical in use

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Foliac Core and Mould Dressing is an inflammable dressing which may be applied by brushing, dipping or spraying. It is not injurious to health. Easy to work, it can be used on all types of sands; it strips easily, leaving an excellent surface. Foliac Dressing prevents metal penetration when casting high-tin phosphor bronze.

A test with a free 7 lb sample will convince you of the superiority of this product. Write to:

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FOR HIGH DUTY CASTINGS

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In 15 ton casts direct from receiver to required analysis

Castings made from these irons have greater density and toughness. You will have fewer rejections, greater freedom from cracks, breaks and other defects.

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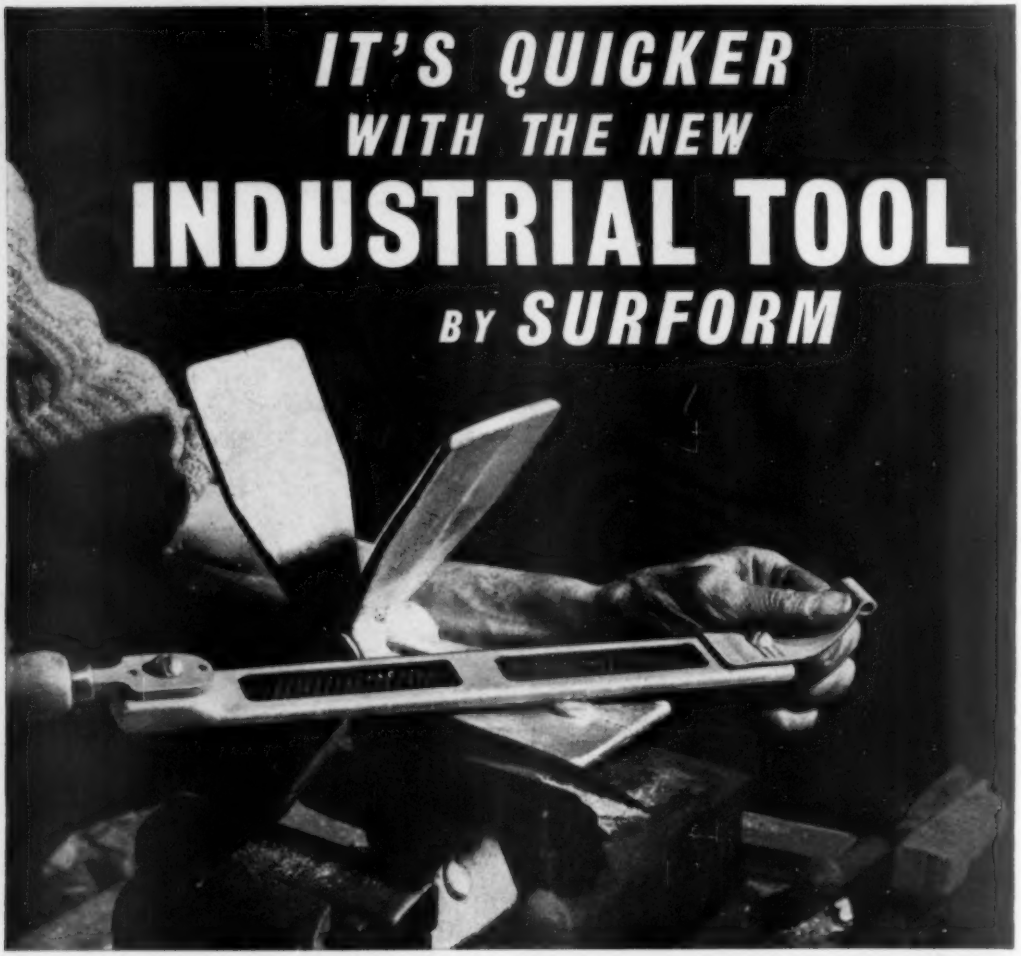

Foundries that are using the Industrial Tool with the new 'Blue' Blade report excellent results in removing flashings and runners. "Smoother finish," they say, "Faster." In short—a non-clogging tool that's designed for the job.

Tested by P.E.R.A. Accepted by the Council of Industrial Design for 'Design Index'.

- The blade will not clog because for every cutting edge there's a clearance hole through which the cuttings pass freely.
- The ground teeth are set at a positive angle which means that the blade cuts all the time.
- The teeth are set to cut to a constant depth.
- One 'Blue' Blade removed over 48" of 1" square mild steel on a Herbert File Testing Machine.

SURFORM INDUSTRIAL TOOL 25/- Available with either straight or cranked handles.
Replacement 'Blue' Blades 4/3 *Blade an invention of Firth Brown Tools Ltd.*

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● SPECIALLY DESIGNED FOR INDUSTRY

Available through your usual tool supplier or for further details please write or 'phone.

FIRTH CLEVELAND TOOLS LIMITED (INDUSTRIAL DIVISION), LOCARNO ROAD, TIPTON, STAFFS. TIPTON 2604

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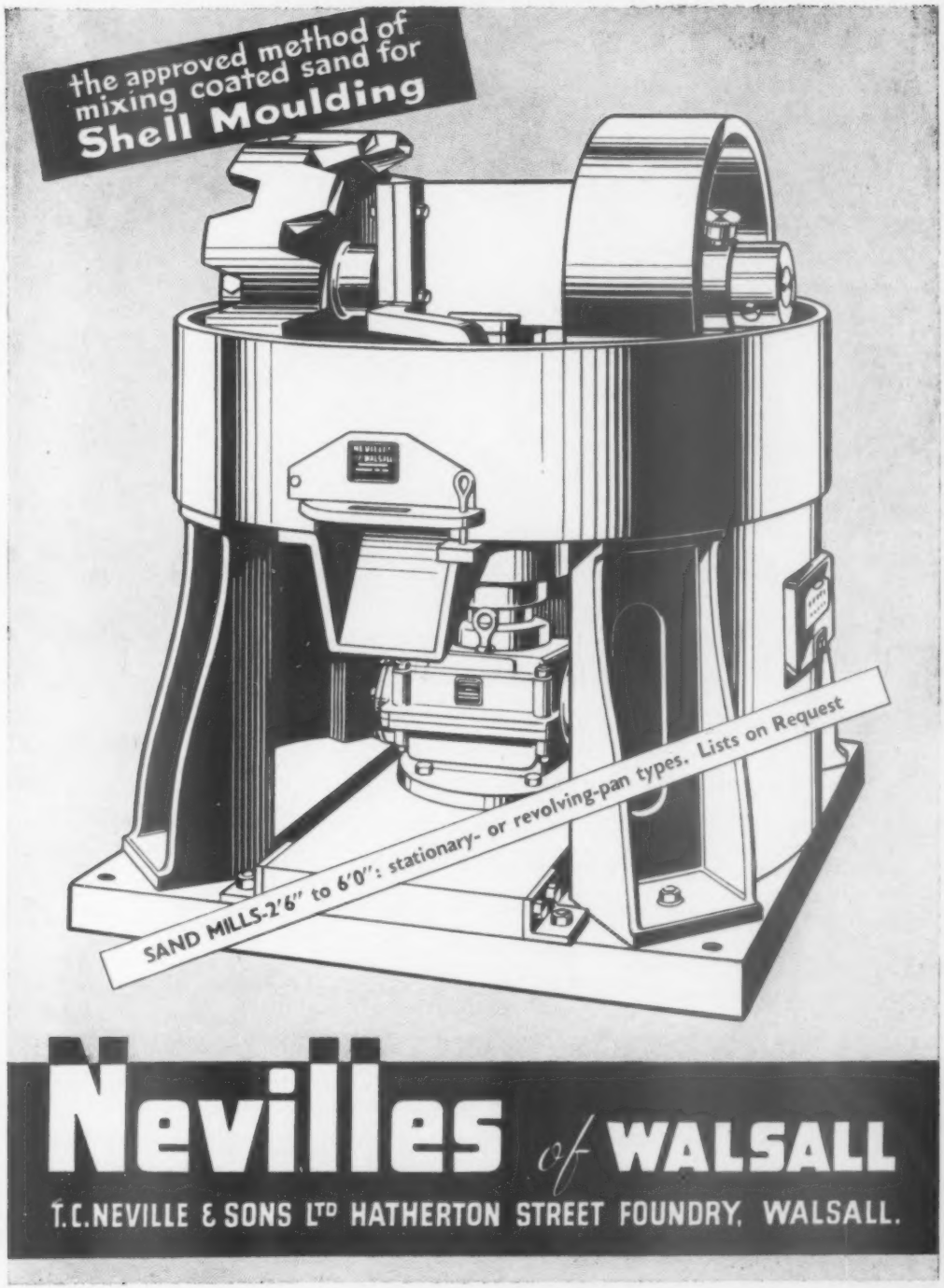
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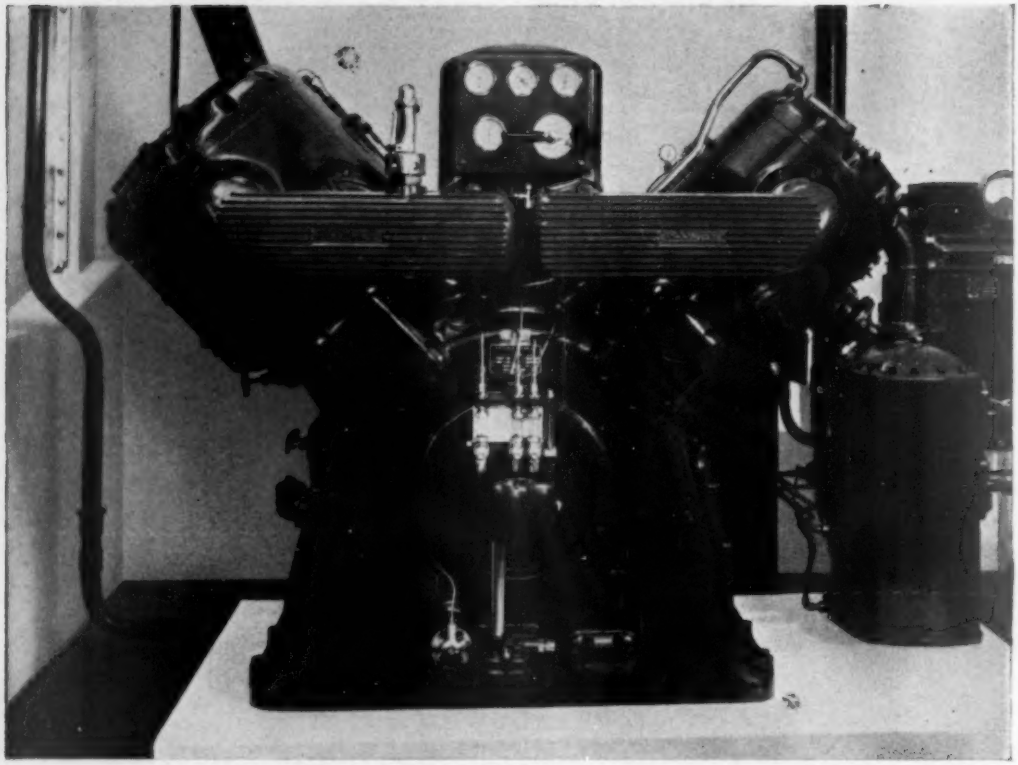

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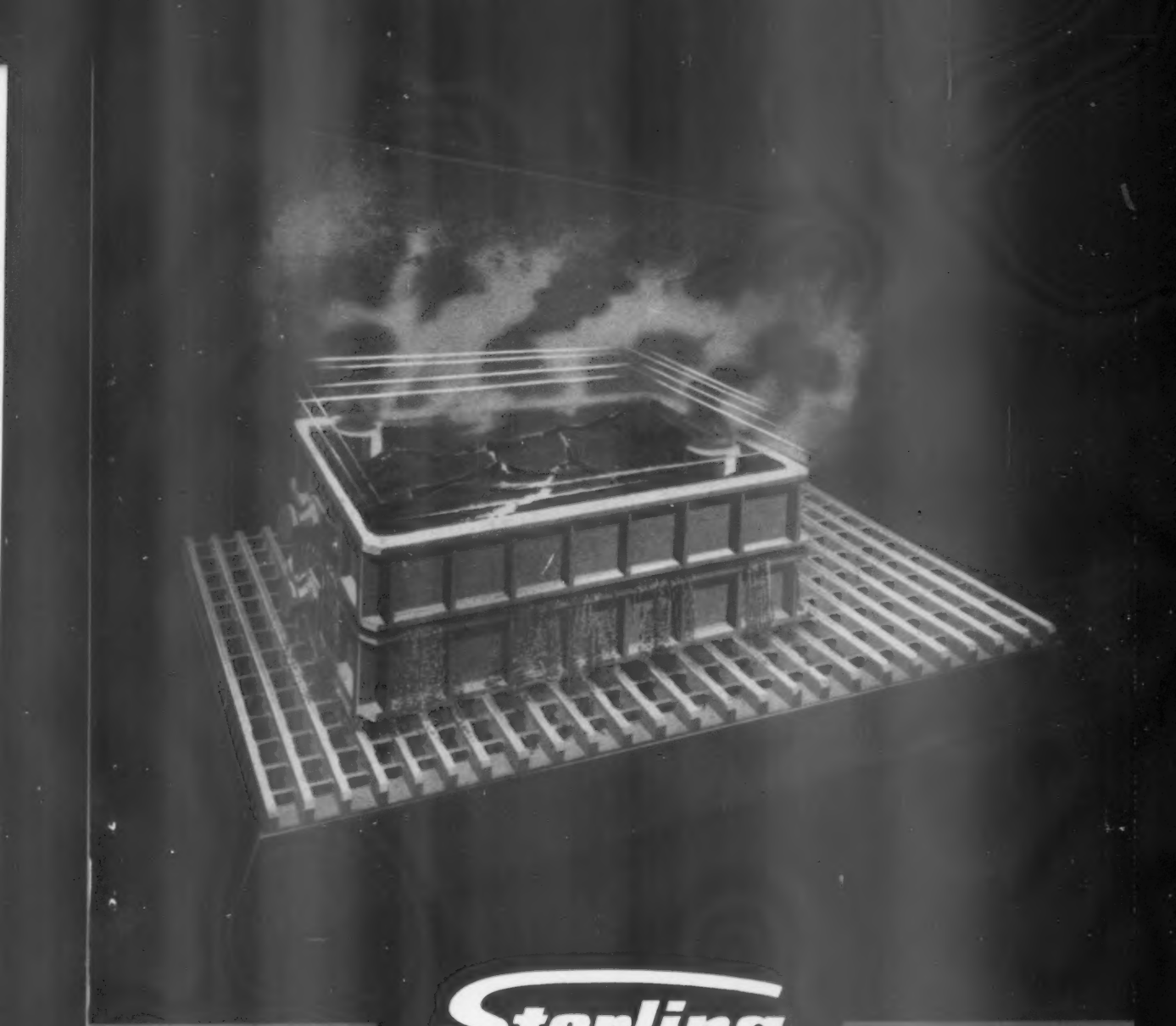

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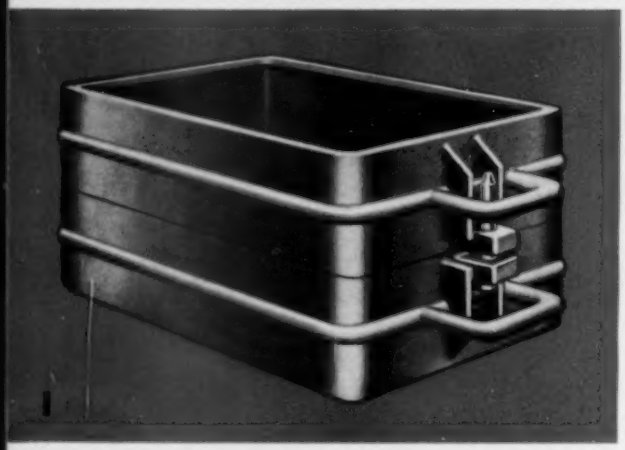
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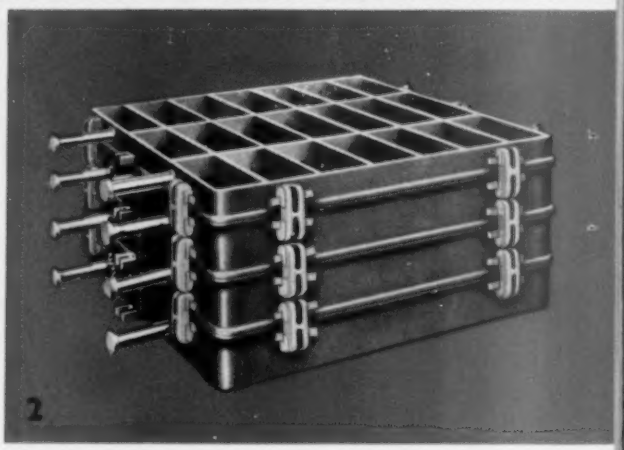
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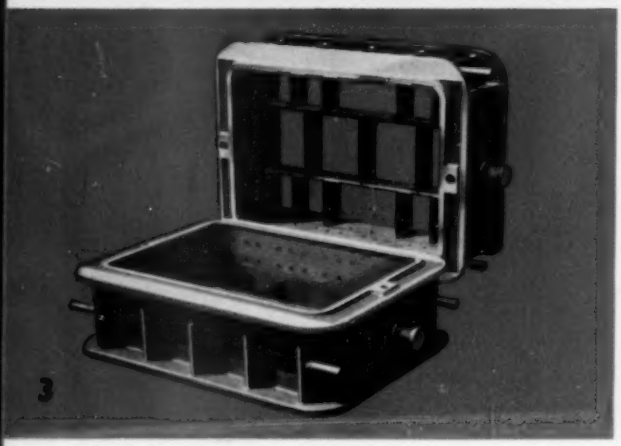
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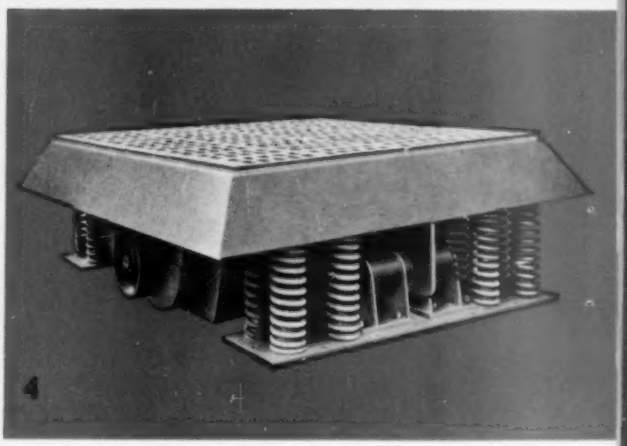
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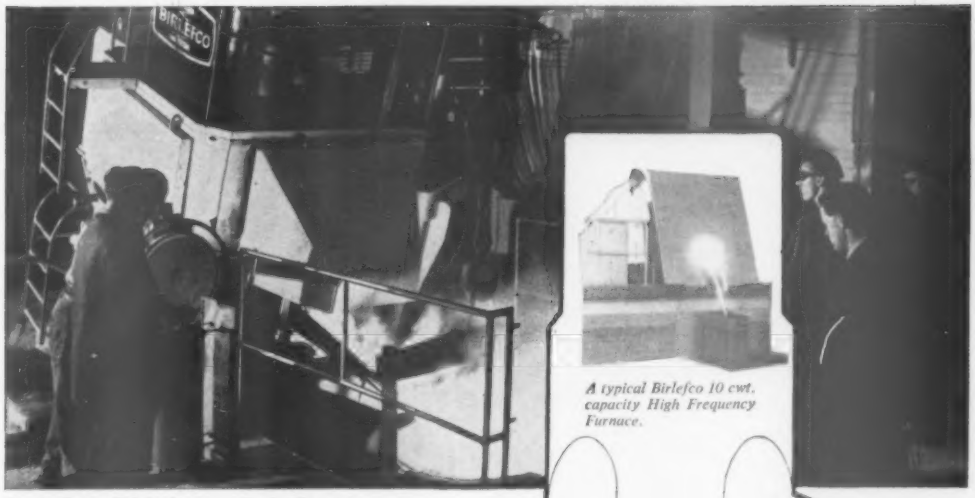

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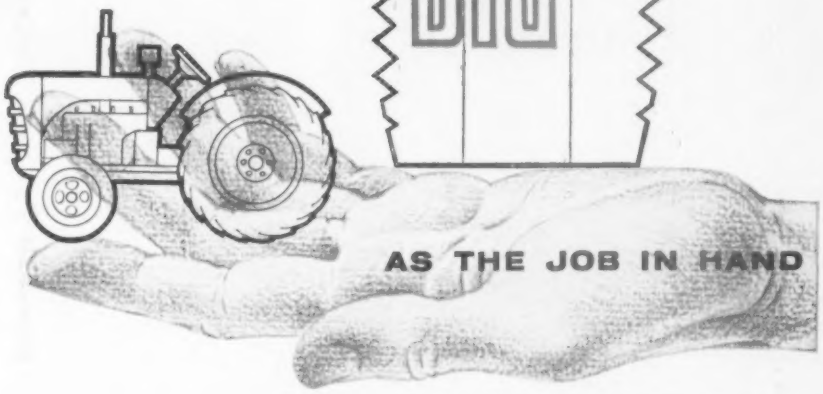

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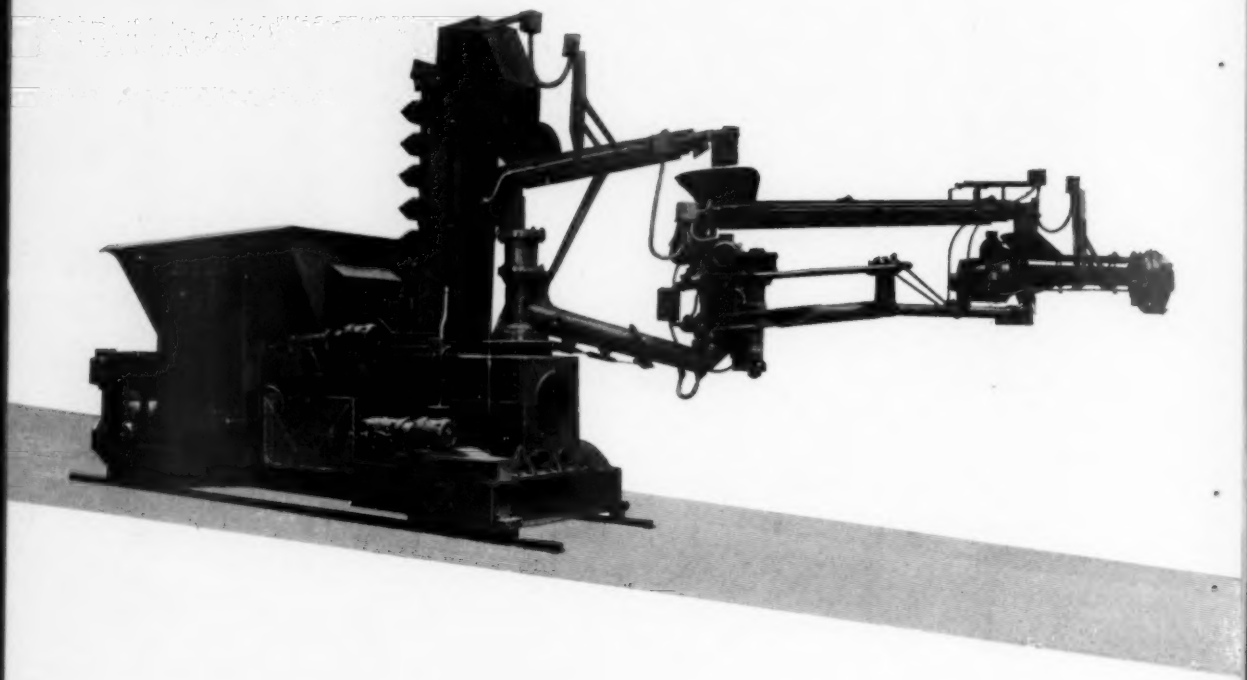

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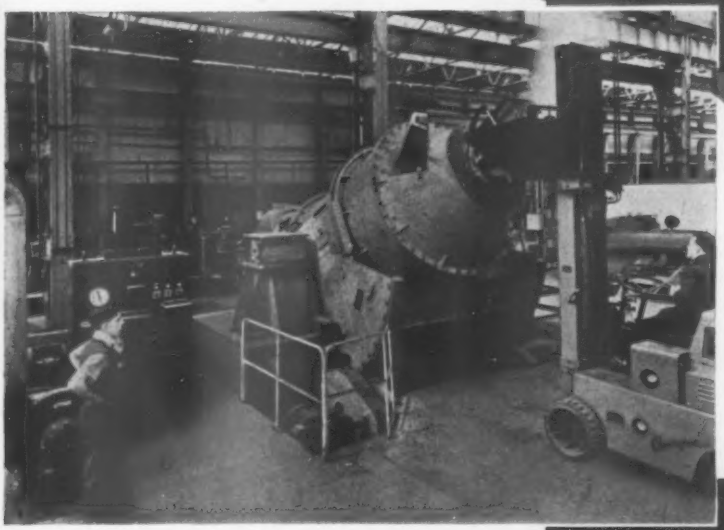

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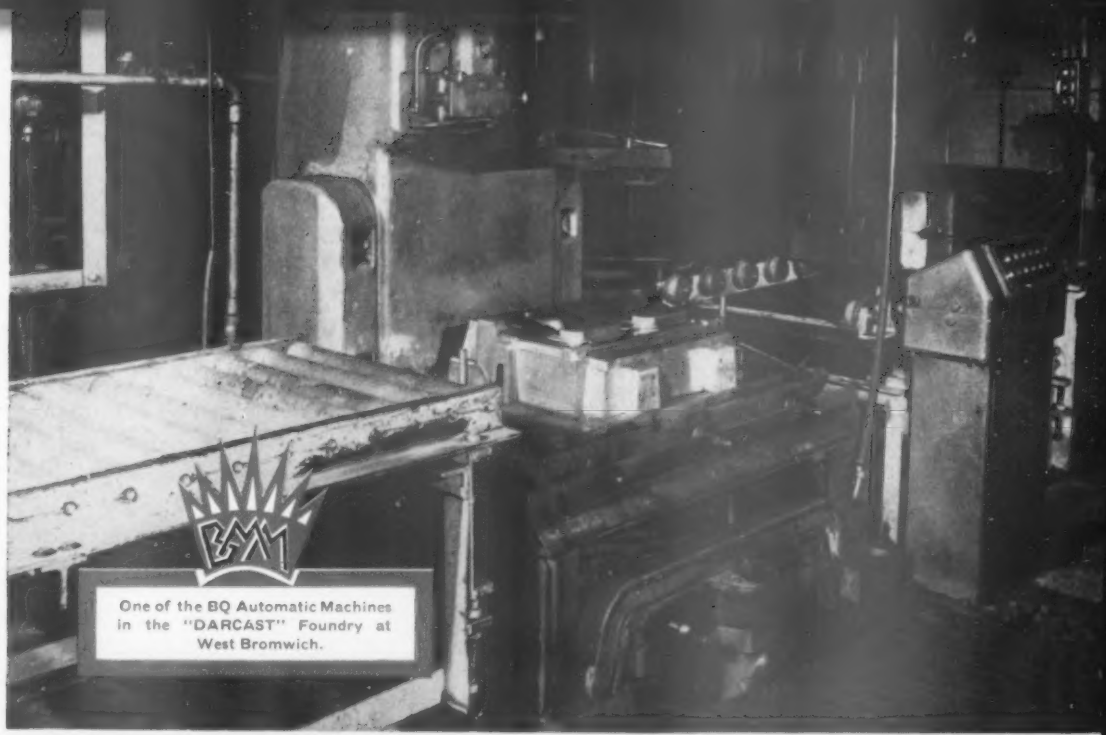

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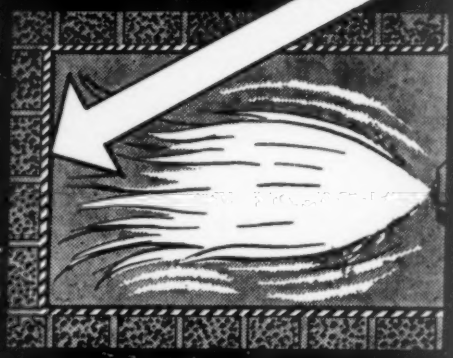

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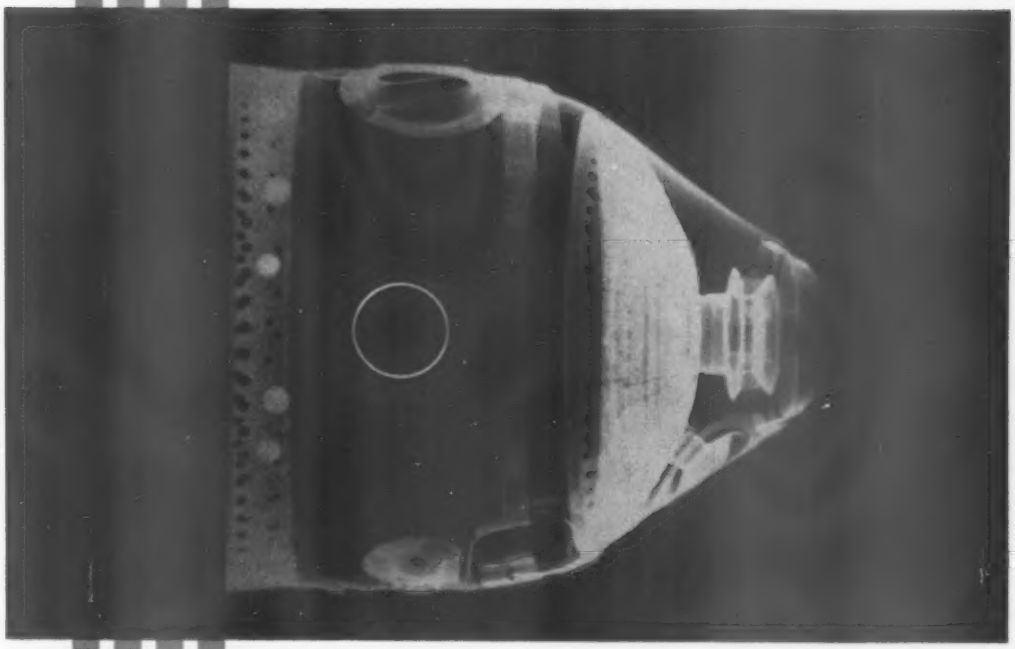

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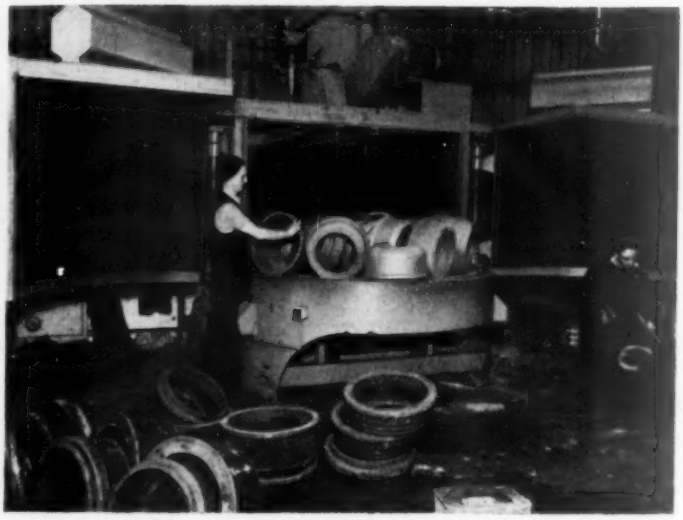

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FOUNDRY TRADE JOURNAL

Vol. 111 August 31, 1961 No. 2334

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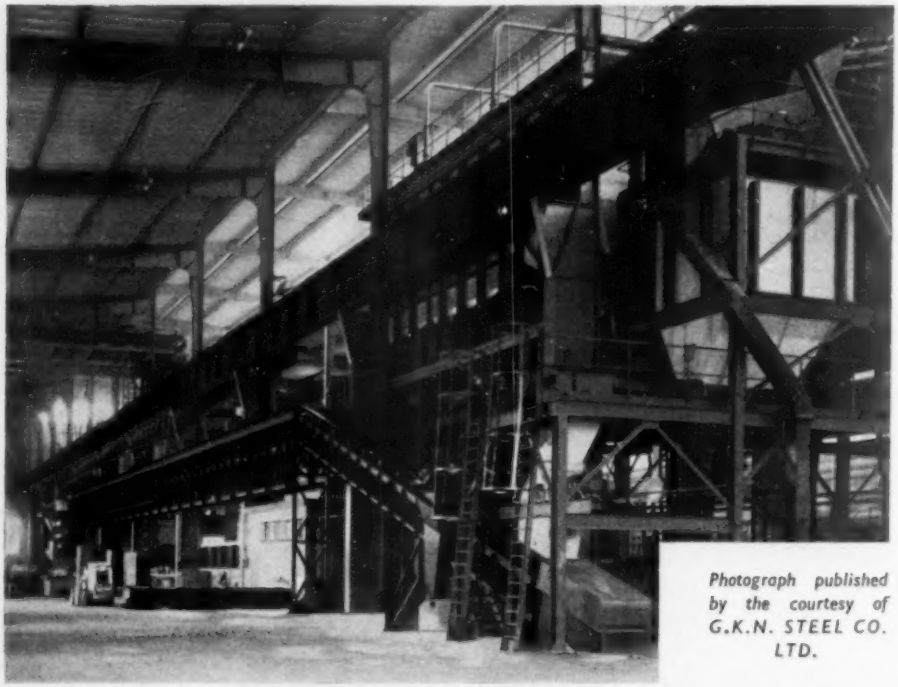

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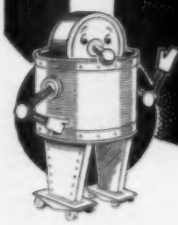

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FOUNDRY
TRADE JOURNAL
Vol. 111 August 31, 1961 No. 2334

Safe Working with New Processes

It is incumbent upon foundry executives to take cognisance of the industrial hazards involved whenever they adopt new processes or use new materials. Whilst the basic principles of good-housekeeping apply under all circumstances, yet fresh and sometimes unrealized dangers may arise. For instance, an American foundry which had been operating the shell-moulding process for some years had allowed dust to accumulate in the rafters and when removing it failed to realize that it was explosive and an accident resulted. It is wise to presume that every material and process has its latent dangers and it should be ascertained in the earliest stages just what form they take. There are available a number of sources of information, *e.g.*, the founder injecting calcium carbide into his molten metal will find on consulting his factory inspector that the storage of this material is governed by a Statutory Order.*

The use of oxygen in foundry practice is increasing and the manufacturers of this gas will inform inquirers as to the need for special lubricants in place of oil to minimize risk of conflagration when using it. As is well known, a number of foundry processes evolve, if not properly controlled, quantities of carbon-monoxide gas, and that is one reason why the use of coke braziers for space heating and for mould drying is prohibited in the shops. Some of the new processes give off a fine dust and local ventilation is called for. Again with some of the materials used in modern processes, there is a risk of dermatitis, and special clothing, especially the use of gloves, is needed. Fortunately, the cost of adequate protection in most cases is not high, and is certainly cheaper than an accident to, or the prolonged illness of, an operator.

Thus the advice is given, that when a new machine is installed the local factory inspector should be asked if he is satisfied with its siting and safety in functioning. As for new materials, an enquiry addressed to the appropriate research association, or the manufacturers, will disclose all the germane information as to its storage, handling, inflammability, and any noxious properties. Where industrial safety precautions are concerned, ignorance of these factors can never be counted blissful, whereas wisdom on the subject is very easily attained at the cost of a simple inquiry.

* See page 269 of this issue

CFA Training Courses

The training section of the Council of Ironfoundry Associations has issued a provisional programme of courses to be held between November 1961 and June 1962. From November 6 to 10 there is to be a second short technical course on "Moulding Machines, Mould Materials and Defects," designed to provide background technical information for those without advanced technical training (only a few places remain as the first course, held in May, was heavily oversubscribed). This is followed, from December 11 to 15, by "Foundry Metallurgy and Cupola Operation," a considerable demand having been made for a fourth course on these subjects. It is intended for a similar type of participant to the "moulding machines" course.

The period February 19 to 23, 1962, has been reserved for a course on "Cost Control and Management Techniques in Foundries." This is the first of an entirely new series of courses, part of which will cover similar ground to the one-day study conferences on "Foundry Costing and Estimating" arranged by the CFA in the past. Other subjects covered will include work-study, labour relations, customer relations, communications and industrial law. The course is intended for junior managers and others who may need to broaden their knowledge of management techniques and who would benefit from the opportunity to exchange their views with those in similar positions in other companies in the industry. The last course envisaged, to be held from June 4 to 9, 1962, is on "General Foundry Supervision," and is the 15th course arranged by the training committee of the CFA for foremen and supervisors in the foundry industry. It will deal mainly with the supervisor's position as a member of management, and by broadening his knowledge of the background to his job, should contribute to the raising of his efficiency.

General Information

All the courses are residential and last from lunchtime on Monday to Friday afternoon. They will be held in different parts of the country, and full details, including location, accommodation arrangements, etc., will be made available well before commencement; the fee for each course will be 20 guineas. In view of the heavy demand for places, companies are asked to make provisional reservations on a form obtainable from Mr. F. C. Hayes, education and training officer, Council of Ironfoundry Associations, 14, Pall Mall, London, S.W.1.

An interesting fact relating to these courses is that a number of companies have written to the CFA during the last month or so asking for dates for this winter and the spring of next year—this seems to indicate that they are planning the training of supervisors in such a way as to include nomination on the courses.

Panel to Aid Exporters

The North Midland Regional Council of the Federation of British Industries has organized a panel of experts to assist smaller firms in the problems of exporting. Members of the panel are prepared to give practical and personal help to novice exporters within the same industry or type of industry. The local Chambers of Commerce, the National Union of Manufacturers, and four local hosiery manufacturers' associations have pledged their support. The panel consists of 14 members covering the principal industries in the North Midlands.

BPA Visit to Foundries in the Ruhr

In co-operation with *Rationalisierungs Kuratorium der Deutschen Wirtschaft* (its German equivalent body) and the *Verein Deutscher Giessereifachleute* (German Foundrymen's Technical Association), the Birmingham Productivity Association is organizing a visit to five iron foundries in the Düsseldorf area during the period October 24 to 27. The foundries to be visited, which include both jobbing and repetition plants, producing castings in grey, malleable and special irons are as follow: (1) George Fischer G.m.b.H., Mettmann, which company has a malleable iron foundry producing blackheart and whiteheart castings up to 2 cwt., a jobbing foundry for pipe fittings, and mechanized and automatic foundries for brake drums, steering gear, etc., for motor and agricultural engineering, (2) August Pannen KG., Neviges/Rhld, a grey- and malleable-iron foundry making castings up to 44 lb. for electrical, mining and chemical industries, (3) Rheinstahl Eisenwerk Hilden AG., Hilden, a grey-iron foundry with its own machine shops producing castings up to 2 cwt. for the manufacture of small boilers and radiators, (4) Walter Hundhausen KG., Schwerte/Ruhr, where there is a highly-mechanized blackheart-malleable iron foundry, the castings weighing up to 3 cwt., and also a jobbing foundry, and (5) International Harvester Company, Neuss, a grey-iron mechanized foundry producing parts for the group's own products, weights from 8 oz. to 2½ cwt. and featuring high-frequency coredrying. A visit to the *Institut Für Giessereitechnik* (German foundry technical institute) will also be included in the programme.

The party will leave Elmdon on the mid-day BEA plane for Düsseldorf on October 24 returning on the afternoon of October 27 at approximately 3.45 p.m. to Elmdon Airport. The cost, inclusive of fares, hotel, meals, interpreter, etc., will be £51 per person. Full details may be obtained from the secretary of the BPA, 75, Harborne Road, Edgbaston, Birmingham 15. (It it understood that the party, at the moment, consists of 15 firms.)

Correspondence

To the Editor of the FOUNDRY TRADE JOURNAL

A FOUNDRY ENGINEERS' GROUP?

SIR,— I agree with the "Enthusiastic Engineer (Foundry)" (JOURNAL August 17), on the desirability of forming an Engineers' Group. Such a group could certainly go a long way in improving foundries by incorporating the research data from bodies like BCIRA, BSCRA, Institute of British Foundrymen, Institute of Metals, etc., into the development of improved foundry equipment, but I wonder if the engineer could give more details about the pattern this group would follow.

Yours etc.,

R. K. KAPOOR

Wolverhampton,
August 19, 1961.

FTE & SA Dinner, 1962

Mr. Richard Maudling, M.P., President of the Board of Trade, has accepted an invitation to be the guest of honour at the annual dinner of the Foundry Trades' Equipment and Supplies Association to be held at the Savoy Hotel, London, on February 23, 1962.

Reorganization of Foundries at Wakefield

Details of New Buildings and Plant at E. Green & Son, Limited

Some of the foundry buildings of E. Green & Son, Limited, Calder Vale Road, Wakefield, have been in use for over 50 years. From time to time, these have been extended and new buildings added, but it was recognized that a complete reorganization of the company's foundry was needed. What follows is a general description of the rebuilding scheme envisaged, the work already completed, details of new melting plant installed and improved handling facilities. When the new bays are completed, it is intended to transfer the production of gilled tubes from the old bays and change the method of moulding to semi-mechanized production. At the present time, one unit only has been installed and new production methods are being developed.

The engineering business of E. Green & Son, Limited, was founded in 1821 on a small site in Wakefield, in Yorkshire, but expansion soon became necessary and in 1864 the first foundry and machine-shops at the present site in Calder Vale Road, were completed. Since this date, the size of the site has been extended and the workshops and office buildings to-day cover an area of over 20 acres. Following the introduction of the now well known Green's Economiser in 1845, the company has built up a commanding international reputation in the field of efficient steam-plant accessories and at the present time, the principal output of its foundry is absorbed in its own products, mainly comprising economizers, air-heaters and dust-collectors.

Background to Reorganization

It may be said regarding the plan view (Fig. 1) that the foundry buildings of E. Green & Son lie to the south of the works, bordering on the waterway known as the Old Cut. These buildings, mostly erected over 50 years' ago, comprise 12 bays running from north to south. The first three bays to the west house the mechanized foundry plant and the last bay, to the east, is a large, lofty bay now used as a pattern store.

The range of castings produced for the company's products includes gilled tubes, heater tubes, headers, branch-pipes, damper door-frames and cells for dust-collectors. The production of gilled tubes in particular is a highly-skilled job; on a 12-ft. long tube, for instance, there are approximately 130 gills at 1-in. spacing. Almost the entire production of the company's mechanized foundry is devoted to the manufacture of short-gilled sleeve castings for high-pressure economisers.

Basically, the company's castings are made in two metal compositions—castings, other than pressure castings, are made in a medium-phosphorus iron, and pressure-resisting castings (consisting of gilled tubes, headers, branch-pipes, etc.) are made to BSS.1452, grade-17 iron. In the manufacture of gilled tubes, the metal composition is critical, since

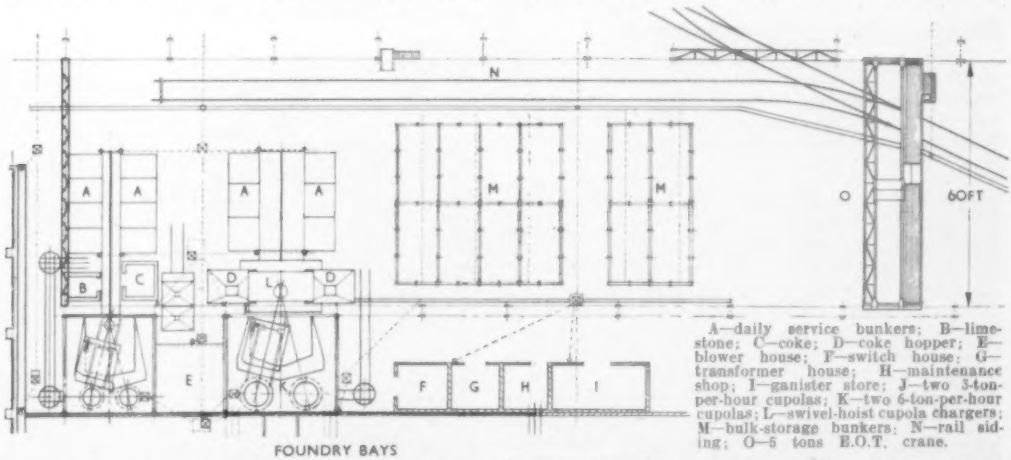


FIG. 1.—*Part plan of the foundry services of E. Green & Son, Limited, showing the position of the cupola plants, storage and service bunkers, ganister store, cupola chargers, etc.*

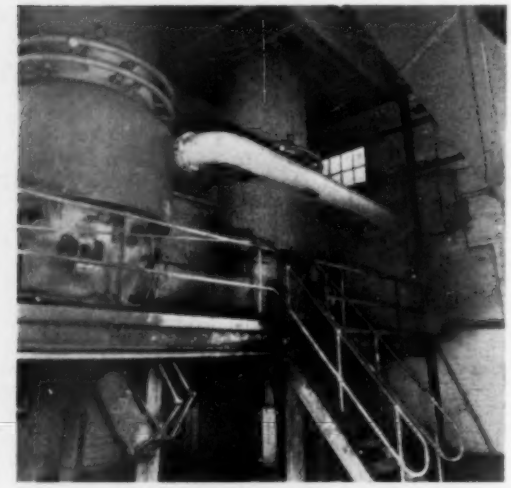


FIG. 2.—*View of the 6-ton-per-hr. cupolas showing the annular rings used for water cooling.*

this type of casting is sensitive to changes, both with respect to physical dimensions and metal structure.

With the reorganization of a section of the foundry using new melting plant, it is now possible to achieve quicker distribution of metal to the moulds on the floor by the use of an electric mobile truck, thereby reducing possibility of faults which can result in waster castings. With the new melting plant (to be described later) and the method used for the distribution of metal, the labour force required for manning the company's cupolas has been reduced by over 50 per cent.

General Development Work

Taking into consideration the amount of labour required to man the old-type cupolas, it was decided that the first stage of foundry reorganization should be the installation of a new melting plant, adequate to cater for the volume of castings required and also the two basic metals to be poured. Hence, two separate cupola plants were installed, one comprising two 6-ton-per-hr. cupolas and the other two 3-ton-per-hr. units. The main reason for the choice of the latter was for the production of any special alloy cast irons which might be required from time to time. (Fig. 2).

It will be seen from the general arrangement drawing of the foundry reorganization (Fig. 1) that a new stockyard gantry has been built outside the (south) wall of the foundry—see also Fig. 5. This gantry has a span of 60 ft. and incoming materials are brought beneath it by rail, metal being handled directly from wagons by an electromagnet carried by a 5-ton capacity electric overhead-travelling crane. Provision has been made for the bulk storage of pig-iron and scrap, amounting to a total of 1,500 tons. Fig. 3 shows a view of the 100-ton capacity pig-iron storage bins in the stockyard. From the bulk storage, metal is handled to the daily service bunkers from which the cupola charges are made up. Coke is also arranged to be brought in by rail in special containers which are emptied into overhead hoppers by special tipping-gear, Fig. 4.

Installation and Rebuilding

Apart from the melting plant, as a first stage in the reorganization of the foundry, it was decided to erect three new bays, two of 50-ft. span and an intermediate service bay, 24-ft. wide. These bays were 214-ft. long and had a height to their eaves of 30 ft. With regard to the erection of new buildings, the nature of the ground was poor and all the stockyard gantry foundations had to be "piled" to a depth of 28 ft. Foundations for the cupolas and cupola housing were also piled in a similar manner.

While the building of the new bays has gone progressively forward, production has continued in the old buildings, and as extensive demolition of the existing building would have been necessary had piling been undertaken here, pad foundations, taken down to a suitable strata at approximately 18-ft. depth, were substituted. To date, one new bay of 50-ft. span and the intermediate narrow bay have been completely erected and it is intended that the other 50-ft. wide bay will proceed as soon as production permits.

The design of the new buildings consists of a conventional steel-frame structure entirely fabricated within the company's own constructional shop to the detailed design of the consulting engineers. Roof sheeting is of Galbestos protected metal with dispersed glazing to give a clear day-

FIG. 3.—*View of the stockyard showing the 100-ton capacity pig-iron storage bins.*

FIG. 4.—*One of the two* 10-*ton coke-storage hoppers being filled from a* 4-*ton railway container. Note the platform which is tilted hydraulically for discharging the coke into the hoppers.*

light area of 20 per cent. of the floor area; the gables are clad in red-coloured RPM* of box-rib section. Natural ventilation is provided by a continuous-ridge ventilator with adjustable dampers controlled from the foundry-floor level. There are no internal rainwater fall pipes within the building and the guttters are of reinforced concrete, cast *in situ* to the specific design of the consulting engineers; these also serve as access walkways and are of ample width for a man to wheel a barrow when cleaning out, etc.

The new 50-ft. wide bay is equipped with two 5-ton capacity overhead-travelling cranes; metal handling from the cupolas to all pouring bays is by battery electric elevator-type platform-truck of special design. As stated earlier, the company intends to transfer the production of gilled tubes from the old foundry bays to the new, where the method of moulding will be changed to semi-mechanized production, using Sandslingers. At the present time, only one unit has been installed, while production by these methods is being developed.

* Robertson's protected metal.

New Melting Plant

The new melting plant installed at E. Green & Son's foundry comprises two pairs of cupolas, one pair of capacity 6/7 tons per hr. and the other of 3 tons per hr. respectively (Fig. 5), housed in new buildings. The cupolas are served by means of drop-bottom bucket chargers, fed from raised service-bins in the stockyard, the material being brought by monorail carrying a suspended weigh container (Figs. 6, 7 and 8). The stockyard itself is serviced by a 5-ton capacity overhead

FIG. 5.—*New melting plant installed at E. Green's foundry, comprising two pairs of cupolas, one pair of* 6 *and one pair of* 3 *tons per hr. capacity, respectively. The* 5-*ton electrical overhead-travelling crane is shown midway along the* 60-*ft. gantry spanning the stock bins.*

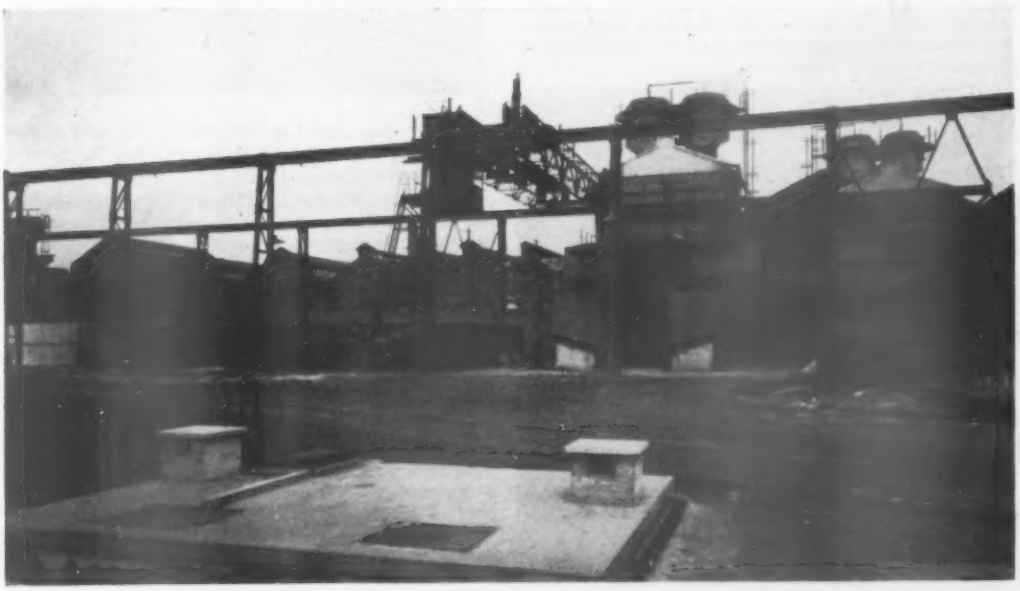


FIG. 6.—*Illustration of one of the drop-bottom weigh-containers suspended on a dial-type weigher which, in turn, is attached to a trolley operating on an overhead runway. The operator charges the pig-iron by hand, moving approximately* 30 *to* 35 *tons per day.*

crane, equipped with a magnet, which replenishes the service bins. This crane also handles the coke containers direct from railway trucks to storage hoppers. Bulk storage in the stockyard is catered for by means of bunkers built up from railway sleepers, the main coke storage being confined in a certain area against pre-cast concrete sections. A railway line, flush with ground level, also acts as a roadway in the stockyard, and incoming materials can be off-loaded by crane from both rail and road transport.

Dealing in detail with the melting plant, the pairs of cupolas have shell diameters of 5 ft. 9 in. and 4 ft. 3 in., and lining inside diameters of 3 ft. 11 in. and 2 ft. 8 in. respectively. The larger cupolas are provided with six 5-in. dia. circular cast-iron tuyeres below the windbelt and connected to the same by means of elbows with regulating shutters. The smaller cupolas are provided with four 4¼-in. dia. circular tuyers placed in a similar manner.

FIG. 7.—*Pig-iron in a skip being delivered into the cupola-charging bucket. Note the control desk on the left where by pressing a button, the operator starts up the sequence which delivers the required charge into the charging bucket, the bucket automatically returning to the base position to await the next charge.*

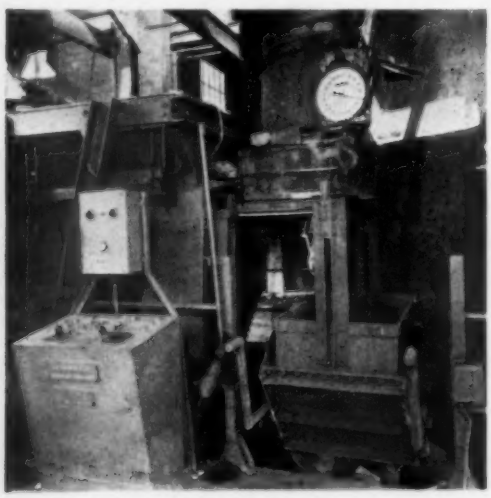


FIG. 8.—*Coke being delivered by vibratory screen to the automatic weigh-container.*

Wet-type arresters are fitted to the cupolas for the suppression of dust and grit (Fig. 9), and a non-recirculating water system is employed, a pumphouse being provided adjacent to the nearby river. Water is used once through the arresters and, after passing through a settling tank, is returned to the river. The usual procedure is to empty the settling tank once per week and records prove that the weight of wet dust collected amounts to the surprising figure of 30 lb. per ton of metal melted.

Cooling and Fans

All the cupolas are water-cooled by means of internal tubular segments, water to these segments being recirculated from a tank positioned on the roof of the blower-house. Incorporated also in the recirculating system is a water cooler, positioned over the tank, a pump being provided and controlled by means of a thermostat unit fixed to the

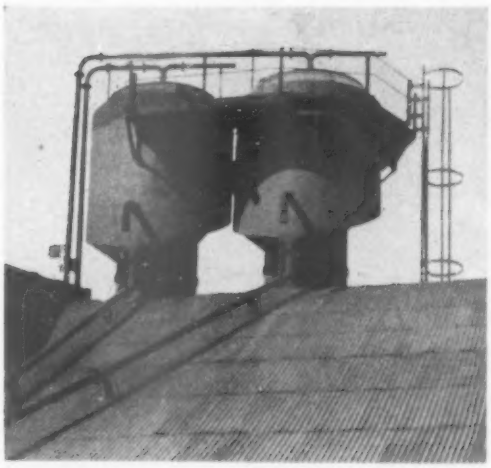


FIG. 9.—*Wet-type arresters fitted to the cupolas for the suppression of dust and grit; water is supplied for the non-recirculating water system from a pumphouse, sited adjacent to the nearby river.*

tank for recirculating the water through the cooler if required; in this instance, water treatment is carried out. Diesel-driven standby pumps are provided in case of power failure of the motor-driven units, and a device is incorporated to indicate any cessation of water to the segments, an audible warning being provided of such an event.

Each pair of cupolas is served by two fans blowing into a common pipeline, so that the fans can operate with either cupola, the changeover being achieved by correct setting of various wing-type valves. The fans for the large cupolas are suitable for delivering 5,000 cu. ft. per min. and are provided with a 50-h.p. motor. The small cupola fans are capable of delivering 2,400 cu. ft. per min. with a 20-h.p. motor. A rail-track is positioned under each pair of cupolas and this extends into the stockyard to a point under the overhead crane. On each of these tracks are steel skips mounted on four-wheel bogies.

Melting-plant Details

In the case of the larger cupolas, at the end of the "blow," the draw-bar support is removed from under the doors and then these are opened pneumatically by a controlling valve situated at a safe distance. The cupola "drop" is contained within the skips and removed manually—after water-quenching—for disposal by stockyard crane. With the smaller cupolas, a conventional prop is used for dropping the doors after withdrawing the locking bar. The cupola spouts on the larger units are arranged at a convenient height for filling ladles suspended on an electric block from a monorail (Fig. 10). After filling, the ladles are lowered on to stillages handled by mobile truck, a suspended weigher being used to check the amount of metal in each ladle.

An instrument panel (Fig. 11) is built into the wall at a convenient point between the two cupola plants, the instrumentation covering volume and pressure measurement, together with ammeters showing the performance of the fan motors. Various indicator lights are included to denote water failure to the melting zone or at the arresters.

Both sets of cupolas are served by swivel drop-bottom bucket chargers of 15 and 8 cwt. capacity respectively, the bucket being suitable for accommodating a complete charge of metal, coke and limestone. For the larger melting units, a 12-cwt. metal charge is used, comprising 50 per cent. pig-iron, 30 per cent. scrap returns and 20 per cent. steel scrap, the coke ratio being 15½ per cent. The smaller cupolas use a similar mixture, but operate with a 7-cwt. metal charge, the coke ratio being about the same.

The 6-ton-per-hr. cupolas are provided with raised stockyard service bins with sloping bottoms, which are served by a double overhead runway system terminating on a single track over the charging bucket. Drop-bottom weigh-containers operate on these runways and are self-opening and closing after the operation of an appropriate lever. These containers are suspended on a dial-type weigher which, in turn, is attached to a trolley operating on the overhead runway. The metallic charge is placed by hand into the weigh container (Fig. 6), a pointer on the weigher dial indicating the required weight for each material. The contents are then

FIG. 10.—*Ladles being filled from the 6-ton-per-hr. cupolas. The former are suspended on an electric hoist block from a monorail and, after filling, are lowered on to stillages which are subsequently moved about the foundry by a mobile truck.*

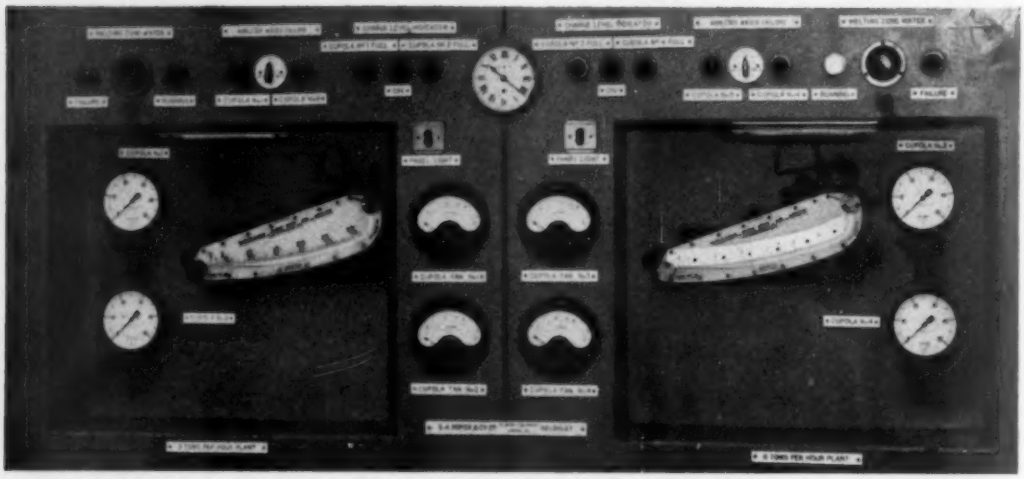
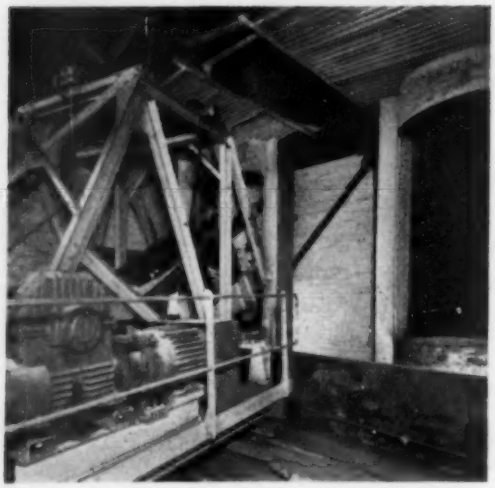


FIG. 11.—*Instrument panel built into the wall at a convenient point between the two cupola plants, instrumentation covering both volume and pressure measurement, water-circulation, water-failure, etc. Ammeters are incorporated for indicating the performance of the fan motors.*

discharged direct into the charging bucket. After closing the hinged safety-gate, the operator presses a button on the control desk, and this starts up an automatic sequence of movements which deliver the required coke-charge into the charging bucket on top of the metal charge. The bucket then automatically delivers the charge into the cupola (Fig. 12) and returns to the base position to await the next charge.

FIG. 12.—*View of the upper end of the charging hoist, with the cupola charging-hole on the right.*



The two 10-ton storage-hoppers for coke are positioned one on each side of the charger and these are filled by means of railway containers, each holding 2-tons 15-cwt. of coke. To effect this an hydraulically-tilted platform has been arranged whereby the containers, after being placed in position by the stockyard crane, are tilted, and discharge their contents directly into the hoppers. The operator at platform level has but to release the door on each container and attach chains for removing the empty container by crane. The 3-ton-per-hr. cupola plant is served with a similar system from a single monorail, but here no coke storage-hoppers are employed, the coke and limestone being shovelled from suitable bins at ground level into a weigh container. It has been found that with both the 6- and 3-ton-per-hr. cupola plants, one man is sufficient to operate the charging system.

Acknowledgment

Grateful acknowledgment is recorded on behalf of readers to E. Green & Son, Limited, for permitting publication of details of their foundry layout and plant. Thanks are also due for help in compilation and illustration of the account received from executives of the Wakefield firm and also from John Gardom & Company, consulting engineers for the whole rebuilding project and E. A. Roper & Company, Limited, suppliers of the melting plant and its ancillaries.

All those responsible for the rebuilding, rehabilitation and re-servicing of the plant are to be congratulated on a most efficient workmanlike job, in which several novel handling systems have been exceedingly well integrated one with another.

Vienna Congress Papers, III

The JOURNAL's comprehensive reports on the general events, works visits and technical content of the International Foundry Congress held this year in Austria are continued by the abstracts from papers* which follow and concluded by general comment on the proceedings.

Continued from page 203

Hot-tearing of Cast Steel (Belgian Paper)

By Prof. A. De Sy, J. Van Eeghem and R. De Groote (in French)

Assuming the principle that hot-tearing of steel was primarily necessarily a function of its composition, the authors had studied the subject and in a brief review of literature had established that many data were discordant and even contradictory. Indeed, their own experiments with the hot-tearing of test-bars cast in sand moulds and shell moulds had given a very high scatter of results and did not permit any valuable contribution to be drawn concerning the influence of different elements (with the exception of sulphur) on the hot-tearing of steel. It was concluded that these further results explained the contradictory data published in literature and that one could not study intrinsic hot-tearing of steel on sand-moulded test-bars, as it was difficult—if not impossible—to maintain constant all the mould variables. Thus in order to eliminate mould variables from interfering, the authors had made use of a hot-tearing test-bar cast in a metallic mould, thus realizing near constancy of mould conditions. The systematic study of the influence of S, P, C, Mn and Al in steel in relation to tearing showed that the influence of sulphur was particularly harmful, and that this adjective applied also to the influence of phosphorus and aluminium. The influence of carbon was unfavourable to tearing, whilst manganese was neutral with regard to prevalence of this characteristic.

Comment

Over the presentation of this paper, Dr. Sigut, secretary of the Austrian Foundrymen's Technical Association, presided. The gathering of 100 or more was addressed first by Mr. J. Van Eeghem —giving a resumé of the paper—and one of his co-authors, Prof. De Sy, was also present.

Elaborating on the short summary given earlier, Mr. Van Eeghem, speaking in French, said that only hot-tearing at temperatures above 900 deg. C. had been dealt with and structure, shape and composition of test-bars was fully taken into account, the form of the specimen being particularly important.

A main difficulty with sand-cast bars in the past had been that the moulds were not rigid enough and he went on to elaborate on the earlier steps which had been made to try to secure test reproducibility amongst different steel-foundry concerns. The abortive nature of these tests had led the authors to their decision to use a pure synthetic steel for their samples and a metal mould to cast them in. Mr. Van Eeghem then illustrated the centrifugal casting method used for producing test-bars, which weighed 40 gm. each and had conical end-pieces, and outlined the melting method in an argon atmosphere which had been applied to producing the "synthetic" steel.

First the effect of sulphur on hot-tearing had been studied and then that of carbon and sulphur together. The various percentages of manganese present in the samples tested had shown no detrimental effects of this element on hot-tearing, except when insufficient was present and then cracking was bad. Heterogeneity of phosphorus in the test-bars (even when quite small total amounts were present) had also caused hot-tearing, but generally speaking sulphur was twice as harmful as phosphorus.

Contrary to previous thought, the shape of the sulphur constituent present in the steel had been found to be without effect on hot-tearing. Aluminium had been found to promote hot-tearing and also to have an influence on the sulphur effect because it caused intergranular separation of the sulphur constituent. It appeared that it was not residual aluminium which caused hot-tearing but the residual oxygen associated with it. Concluding his summary, the speaker outlined other possibilities of testing in this way, particularly using argon atmospheres and the centrifugal process for casting test-bars.

Questions and Answers

Questions and answers came thick and fast in the discussion as evidence of the interest evoked by the paper. Replying to the first questioner, who was surprised to learn of the effect of carbon and requested more data, Mr. Van Eegham confirmed the results shown in his diagrams and said previously the effect of carbon could not be assessed—that was with sand-mould specimens. (Here several of his slides were shown again.) It appeared, said the first questioner, that effects of carbon and sulphur could not be assessed separately and the author did not disagree. Asked about the effect of gases and whether any further sand-mould tests were envisaged, the

* Additional copies of the volume of Congress Papers are available from the Congress secretary, Dr. F. Sigut, *Verein Osterreichischer Giessereifachleute*, Ferstelgasse 1, Vienna, 9, at a cost of 250 Austrian sch. (about £3 12s.) plus postage. Individual papers are also available at 12 Austrian sch. each (about 3s. 6d.), again plus postage.

lecturer replied in the negative to the second query, and confirmed that tests were continuing, in reply to the first point. The next item on the agenda, he said, was to determine the amount of stress present in the test-bar at various temperatures and the further acquisition of new apparatus would then permit gas-effect assessment.

As to practical applications, Mr. Van Eeghem said it was quite certain that steel showing a tendency to hot-tearing in the test set-up would have the same tendency in industrial use. He agreed with another speaker that at certain compositions of phosphorus and sulphur, it was important to know how the casting had been made, *e.g.*, furnace practice, temperature of pouring, etc., must also be watched and desulphurizing would help.

To a query as to the effect of aluminium on pinhole formation in steel castings and whether this depended on the amount of sulphur present, the author replied that there was no correlation between sulphur and aluminium percentages, the presence or absence of pinholes being a function of the deoxidation of the steel; too little aluminium might give pinholes and too much aluminium hot-tearing. No data, he said, were yet available (until the new apparatus came into use) on the effect of atmospheric humidity on hot-tearing. Asked to confirm that a certain aluminium percentage was dangerous because it led to grain-boundary segregation of oxide and deterioration of mechanical properties in addition to hot-tearing, the author replied that grain-boundary segregation of any sort was detrimental in so far as hot-tearing, tensile or other mechanical stress-values were concerned.

Gas Holes in Castings caused by the Properties of Cores (Czechoslovakian Paper)

By Dipl. Ing. J. Ornst (In German)

A mathematical formula defining the conditions of gas-hole formation in castings, caused by the properties of cores, was put forward by the author in an attempt to express even very complicated conditions in a simplified way. The author stated that in order to solve problems of gas-hole formation, it was insufficient to take into consideration only the gas content of the various mixes, but it was necessary to evaluate the whole system—core mix, the core itself, and the metal. It was also necessary to consider the kinetics of gas development and the first step was to deal with surface development of gas during the pouring operation. All considerations were focused on this point.

When considering the time of reaching the first maximum rate of gas evolution after covering a core with molten metal, it was clear that surface development of gas was caused by binders burning on the core/metal interface only. It was more useful for foundry practice, therefore, to express the gas content as a function of the core's surface and not as a function of a weighed sample as was considered previously. A new method of measuring the gas content of the sand mixtures was therefore suggested. This method recorded the kinetics of gas development in addition to conditions in the core during the casting operation. In the course of taking observations, it was found that no condensation products of burning were formed. An assessment of the course of casting from the viewpoint of the formation or otherwise of gas holes was defined by a coefficient of "boiling up." From the calculated value of this index for a given mix the degree of safety when casting and the probability of the occurrence of gas holes in a casting could be determined. On the other hand, using the coefficient of "boiling up," a correct formulation of sand mixes could be established beforehand, the author stated, in relation to the type and content of binders and permeability of the mixture. The amount of core venting required might also be estimated in this way. The author had found that core vents had the same effect as if the cross-sectional surfaces of the coreprints had been enlarged by the surface area of the vents. He concluded his paper by saying that the mathematical formulæ put forward had been elaborated under some presumptions and simplifications governed by the attempt to reduce it to the simplest form at which it could be accepted in practice; it had proved useful in all cases of application up to now, but a longer period of use might show a necessity for a new arrangement, *e.g.*, that of introducing some new variables, etc.

Investigation of the Longest-admissible Pouring Time for Steel cast in Green-sand Moulds (Polish Paper)

By Dipl. Ing. K. Hess (In German)

In his opening remarks, the author said that to determine the optimum pouring time for a mould, it was necessary to assess the range of possible pouring times and, in particular, knowledge was also required for the maxmium admissible time for pouring castings, while avoiding the formation of defects. This, he said, was especially important during the casting of steel. In his paper, he discussed the influence of the method of running the casting and method of pouring on the pouring time for a mould. An analysis of the heat-flow from the metal stream into the mould was presented and from an interpretation of the cooling rate of the advancing front of the metal stream in a mould, a formula had been obtained for the time for the metal to fill a given mould. In elaboration of the formula expressing the influence of method of pouring, a formula for the maximum allowable pouring time was determined which took into account also the casting properties of the metal.

In another section of the paper, the author gave a detailed description of the technique for determining the advancement of the metal front in the mould. This consisted essentially of utilizing contact terminals fixed into the mould wall so that an electrical circuit was completed on contact with the molten metal. This technique enabled the longest permissible time for pouring a mould to be determined under the most unsuitable conditions of pouring. Investigations also described covered the pouring of greensand moulds of differing section-thicknesses with a cast steel containing between 0.15 to 0.5 per cent. C at different pouring temperatures. During the experimental work, the author determined the additional relationships between the permissible pouring time of the mould and the required degree of dimensional accuracy in the casting. From theoretically-established and experimentally-confirmed formula, a nomograph was presented which enabled the interdependence of admissible pouring time, pouring temperature, fluidity of cast steel and the dimensional accuracy of the casting to be assessed.

Influence of Vacuum Melting on the Structure of Inoculated Cast Iron

(Netherlands Paper)

By Professor A. J. Zuithoff and Dr. R. Kortmulder

(In German)

In this paper, the authors tell of their studies of the influence of vacuum melting on the structure of grey cast iron, especially its influence on undercooling and on the mechanism of graphite formation. The material used was an iron/carbon/silicon alloy of a near eutectic composition and with various amounts of manganese and sulphur. Each composition was melted in a high-vacuum installation in an alumina crucible. The melt was heated above the melting temperature to various degrees of superheat and then inoculated. It was found that there was a remarkable influence of vacuum melting on the structure, all samples had an undercooled structure with D-type graphite, also when poured under dry air or nitrogen after vacuum melting. Only a quite high sulphur content gave a different structure, with graphite of the A-type, and all vacuum-melted alloys were unaffected by superheating and inoculation. From the results of the investigations, it was concluded that vacuum melting gave a very high degree of deoxidation. In that condition the authors contended that the melt was unresponsive to inoculation with ferro-silicon, and that this proved that small oxide nuclei were able to influence graphite crystallization. They stated that these results were in agreement with other investigations and could lead to a better understanding of the mechanism of inoculation. Apart from this, they stated that vacuum melting gave the possibility of a comparison being made between several graphitizing inoculants.

Comment

To about 120 delegates, the authors elaborated on their synopsis quoted above by saying that vacuum melting was gaining in importance especially for titanium and other high-duty alloys. On the other hand, there was also available new vacuum-melting equipment, and vacuum pouring or ladle treatment under reduced pressure had also gained in importance. The speaker then outlined incidental advantages of vacuum work and said that so far there had been little vacuum treatment of cast iron except isolated Japanese and German reports.

As long ago as 1937, it had been proved (mainly by British research workers) that both carbon monoxide and hydrogen could influence cast-iron structures. The new experiments they were reporting on were not made with the objective of developing any new process but just to see what happened. As basic metarial, they had taken cast iron with 3 per cent. each of carbon and silicon and had varied the amounts of sulphur and phosphorus. He then showed slides of equipment used and went on to outline the results.

Results

The samples with no sulphur and no manganese were shown to be insensitive to inoculation—all showing type-D and some rosetted graphite—and superheating had no effect. Yet when the same material was inoculated in air, the graphite was changed to type A. In the experiments with manganese- and sulphur-containing material, it had been found initially that both elements evaporated rapidly under high-vacuum conditions and so a nitrogen atmosphere was introduced. The presence of manganese alone seemed to have no effect on response to inoculation when in vacuum. The addition of sulphur, however, completely changed the picture, the graphite being altered to A-type under vacuum. When sulphur and manganese were present together, type-A graphite was also formed. With sulphur alone, under vacuum treatment the metal had shown itself indifferent to both superheating and inoculation.

In an attempt to interpret various results, the speaker said that under normal conditions sulphur nearly always gave B-type graphite and a pronounced dendritic structure, all associated with undercooling and probably caused by gaseous or solid nuclei. These nuclei could be of SiO_2; that would explain the fact that on superheating their effect was nullified because then the SiO_2 was dissociated according to the reactions:

$$Si + FeO \rightleftharpoons SiO_2 + Fe$$
$$FeO + C \rightleftharpoons Fe + CO$$
$$C + SiO_2 \rightleftharpoons Si + CO$$

In this case, reduction of pressure appeared to cause a change of direction of the equation (the explanation quoted was to some extent supported by the fact that the accidental introduction of a silica pyrometer tube into the melt had caused evolution of gas). Thus, in vacuum melting it could be argued that not only was gas removed, but also SiO_2 and possibly other nuclei. When inoculating in air, isomorphic SiO_2 was introduced. Aluminium and calcium had been proved to be better inoculants than silicon and this was confirmed by the authors' experiments because at a low oxygen

level, ferro-silicon could not work as an inoculating agent although aluminium could.

The primary outcome of this work had been to show that vacuum melting could permit of basic investigations of the effect and behavour of inoculants and the future was likely to show increasing use of this "tool."

The first speaker in the open discussion objected to the use of the term "deoxidation" in this context and thought that it should be confined to the reduction of FeO in, say, a steel melt. In cast iron, the effect was different; the solubility of oxygen in iron was higher with increasing carbon. The author agreed with this differentiation and also with the stipulation that it was wrong to talk solely of silica as the only nuclei present because there was also present alumina and this was not reduced by carbon. However, he pointed out that criticism of terms at this stage was to some extent irrelevant because the research was still in its infancy. A French worker confirmed the authors' results when working with synthetic irons under similar conditions, and this concluded the discussion.

Applications of Statistical Methods to Foundry Studies (French Paper)

By G. Blanc and J. C. Margerie (in French)

The authors stated that this paper was intended for engineers with experience in the application of statistical methods to scientific and technical research or to quality control, but that it should also prove of inerest to all those who were still hesitant as to the advisability of using such methods in their own laboratory or works. They had tried to single out, from the mass of tests advanced by specialists in statistical analysis, those which had given the best results in the course of ten-years' almost daily application to problems arising in both research matters and in the foundry industry.

It was now generally recognized that a knowledge of the average of a series of results had no significance unless it was accompanied by an indication of the standard deviation, variance or confidence interval. It was often necessary to compare an experimental distribution with one of the usual theoretical distributions in order to verify certain hypotheses, the test providing a yardstick for adjusting the real distribution to the selected theoretical distribution. It was by no means rare to find that the situation regarding "population" consisted of several distinct populations, and attention was drawn to one or more factors, which it was originally thought could be neglected. For the comparison of averages and variances, the Student-Fisher, Darmois, Hartley or Snedecor tests had been used, according to circumstances.

Since the quality of a product always depended upon a large number of factors, it could always be improved by calculating the coefficient of correlation or regression, a knowledge of which had in many cases made it possible to determine what changes should be made in manufacturing conditions to obtain better results which could be reproduced at will. Control of consistency of manufacture by the use of a control and index card had proved relatively easy to put into practice.

Training of staff in the application of statistical methods was becoming increasingly necessary and could be carried out by means of courses properly adapted to their background of knowledge and by the use of practical publications, taken with numerous examples chosen from the subject concerned and numerical tables which greatly facilitated calculations.

Scavenging Method for the Prevention of Blowholes (Japanese Paper)

By Dr. Kazuro Suzuki and Mr. H. Yamaoka (in English)

Gas pressure formed during the casting process in the mould directly below the mould/metal contact area was surprisingly low and did not exceed the equivalent of a 25 to 30-mm. water column, as shown by a study carried out by the authors and involving different mould materials. The static pressure of the liquid metal was, in general, substantially higher and was lower than the gas pressure of the mould only just under the surface of the liquid metal rising within a mould. The conclusion deduced from this indicated that mould gases do not penetrate into the metal just at any point of the mould/metal contact area, but only at points of low static-pressure, *i.e.*, close to the surface of the metal. These considerations led to the development by the authors of a new process, namely, the "scavenging casting method." With this, penetration of gases from the mould into the metal below the liquid metal level was prevented by the superimposition of a flow of air or argon travelling in the opposite direction. This gas flow could be produced either by suction from the mould cavity (exhausting method) or by the creation of excess pressure in the mould cavity (pressurizing method).

By way of examples, the effectiveness of the method was demonstrated and its superiority over vacuum casting was shown. The new method permitted the use of greensand moulds whereas previously only drysand moulds could be used, and of shell moulds for low-carbon steel castings and for 13 per cent. Cr steel in particular. The authors stated that sufficient mould gas permeability should be noted as a prerequisite for the effectiveness of the method descibed and that the method was not applicable and efficient in cases where the blowholes were not due to gases from the mould, but to gases coming from the liquid metal itself.

Experience with Low-pressure Die-casting in an Austrian Light-alloy Foundry (Austrian Paper)

By I. Berger (in German)

The author followed a description of low-pressure die-castings by the statement that it

would be more logical to term this process as "permanent-mould casting by application of low-pressure gases as an auxiliary." Nevertheless for the sake of simplicity, he said that in this paper the process would be designated as the low-pressure process with the abbreviation "ND process" respectively.

First, Mr. Berger gave a detailed description of the historical development of the process which he claimed had started some 50 years' ago. He then enumerated Austrian experiences which, he said, dated back more than 10 years, and showed examples of castings, with various degrees of complexity, which were produced by the ND process. Next followed a description of the development of permanent moulds operated by rack-and-pinion up to hydraulically-operated moulds and then the possibility of full automation of the process was touched upon. Advantages of the ND process were summarized as follow:—(1) It was a bottom-pouring method, free of turbulence, whereby pouring pressure and speed could be controlled; (2) the casting yield was particularly economical (up to 98 per cent.), resulting from absence of runners and feeders; (3) there were quite extraordinary potentialities for complete automation, and (4) although the process was not suitable or practicable for all types of castings, the ND process was a logical supplement to customary pressure- and gravity-die-casting methods.

Factors Influencing Service-life of Slab Moulds (Austrian Paper)

By Dr. A. Czech (in German)

The author, in his opening remarks, said that considerable variations in the service-life of slab moulds could be studied successfully by the application of mathematical and statistical methods. In this way, a 63 per cent. statistical success relationship had been ascertained between the shape of moulds and average service life, and it should be noted that the influence of such factors proceeded in the direction of avoiding early formation of cracks and peeling. The form of the cross-section, the height, camber of the mould wall, and the taper of the mould were all of particular importance. Amongst operational factors studied in melting-shop practice, the temperature of the respective melts, holding time of the slab in the mould, frequency of use of moulds in service, further machining, and dressing of damaged moulds, were the main contributors to the varying degrees of durability. The degree of influence was assessed as between 20 and 60 per cent., depending upon good or poor durability of the type of mould being considered. The author also pointed out the relationship between "life" and characteristic flaws. Using the material available for the mould in the investigation being described, the method of manufacturing a mould could be established as an influencing factor with a degree of certainty of only 6 to 8 per cent., with welding seams on contact areas between the mould and the liquid metal being especially detrimental. Tests carried out to determine thermal expansion at the middle height of the mould showed that the longitudinal wall expanded about 13 mm. and the transverse wall about 12 mm., thus causing changes of the wall camber which, in turn, led to considerable stresses at the angles. Due to an allotropic change of those wall sections which were subject to the highest thermal stresses, permanent changes of the respective mould's shape would take place after cooling and these in successive heating operations were liable to exert increasing pressure on the inner-wall areas and would cause the longitudinal walls to swell in addition to reducing the camber of the transversed walls. These changes of shape became less significant towards the top and bottom of the mould. Results of tests and comparison of different mould shapes yielded indications for the successful interpretation of factors of influence related to design as well as to operational practice.

Comment

About 80-90 were present for the presentation of this paper on the Wednesday morning of Congress week. The author's survey of his paper was comprehensive and his results would seem to have much of interest to United Kingdom slab- and ingot-mould makers, but of course there are left so many possible variables still unchartered such as, for example, the possible effect of artificial cooling, the possibility of thickening moulds at the centre of their vertical faces, in addition to further foundry and compositional factors not covered by the author.

The discussion on this paper was extensive and ran over the time allotted. It was initiated by a German enquiry as to the author's knowledge of the behaviour of spheroidal-graphite-iron moulds in service and as related to ingot quality. The author's reply was that different works within his group were, in fact, making s.-g. iron moulds; the results so far had been good, there was no hot-cracking and a good mould-surface was retained during use, but it was too early to make a final assessment. A Japanese contributor agreed with this statement saying that s.-g. moulds for 5-ton ingots of square cross-section had given good results, but for slab moulds, insufficient data had yet been collected and some difficulty had been experienced with a s.-g. slab mould for a 10-ton cast.

Replying to this speaker's query as to whether the author had any additional figures for desirable mould-wall temperature-distribution, Mr. Czech replied that he had none himself but other research work had already been published. The effect of density of mould assembly in steelworks' teeming pits and of pre-heating the moulds had already been recorded, he said. He thought it useful to realize that the formation of a fine ferrite in a mould resulted in a "dead-zone" during a mould's use where the metal could be plastically deformed and thus seldom gave rise to cracks.

Vienna Cangress Papers, III

GENERAL CONCLUSIONS

As final comment on the whole proceedings of the International Foundry Congress in Vienna, the writer puts forward the following remarks for consideration by the organizers of future events: (1) Is nine months sufficient a period for the generation of really new material for presentation? This year, the period certainly proved insufficient for preprints of papers to be provided although the technical content of the papers generally speaking was novel and of high standard. (2) Is a formal opening ceremony of the magnitude of that of recent congresses really necessary or desirable? A large proportion of the audiences of such gatherings are bored by listening to long speeches in tongues they are unable to understand. Surely it might be better to initiate congresses with short informal "get-together sessions" over a cocktail or coffee, to give delegates and their ladies real opportunity to meet old friends, to absorb the atmosphere of the host country, and explore the facilities made available to them by the organizers. Any time thus saved could be allocated to technical sessions and reduce the crowding and overlapping of these. (3) In the UK, discussions are often the most valuable feature of a conference and there are two primary requirements for good discussions which need to be borne in mind for international congresses. One is the provision of the text of papers well beforehand—that is, a month or two—bearing in mind that some delegates will require to have papers translated before they can study them and prepare their own comments. Secondly, people who will initiate discussion during a session are a great boon alike to the chairmen of technical sessions and other delegates present. Even if their contribution is somewhat extraneous it does serve as it were to "salt the clouds" and bring down a rain of questions instead of leaving the topic "in the air"—to preserve the metaphor. (4) There is a real need for introducing some novelty into the programmes for international congresses. The Austrians did this very well with their amusing displays at the banquet, and with their Heuriger session, but it might be possible similarly to bring in new features to the technical sessions in future years. Here it is not the writer's place to make suggestions, but symposia, brains-trust sessions, castings exhibitions and demonstrations of production methods need not be ruled out. (5) Are off-the-record discussions to be encouraged? The writer found in Vienna that long after a session had concluded, members were getting together, talking over the papers presented and quite often asking questions of authors the answers to which would have been generally valuable. In some cases, this was observed when there had been no discussion at all immediately following presentation of the paper. The occurrence of this feature points to the need for chairmen to be aggressive in soliciting discussion contributions, and curbing over-long contributions and it might indicate a need for some sort of open sessions to be introduced into the programme, when delegates' second thoughts or questions could be put on previous sessions' papers.

In conclusion of these accounts, the writer wishes to record his personal thanks for all the assistance he received from the Congress organizers in Vienna and the many courtesies accorded to him and special facilities placed at his disposal. Particularly well executed were the instantaneous translation services which often worked under great difficulty and strain. He feels he is voicing the views of the whole of the delegates who attended, and ladies too, in assessing the Vienna event as one that will go down in memory as a most happy and profitable occasion.

American Foundry Industry

The 1961 issue of the biennial publication—*Penton's Foundry List*—shows that the USA and Canada now operate 5,879 foundries, or 206 fewer than two years' ago. The actual position is that in that period no fewer than 600 plants were deleted from the List but some 400 new names were added. The number of Canadian foundries declined by 29 to 483. The American journal, *Foundry*, points out that the rate of disappearance is virtually static and that the tendency is for large foundries to become larger. The State having the largest number of foundries (544) is now California, Ohio with 535 being relegated to second place. A graph shows that both the shell and CO_2 processes continue to expand, especially in the field of coremaking, and to-day, no fewer than 1,570 American foundries are using the CO_2 Process for coremaking. It is reported that whilst there is a decline in the number of cupolas with open-hearth furnaces in operation, there has been a substantial increase (260) in the number of electric furnaces in use (3,140) for melting in the American foundry industry.

Iron and Steel Production Cut

Falling demand for basic pig-iron has resulted in moves by a number of companies to cut back production. The Stanton Ironworks Company, Limited, a subsidiary of Stewarts and Lloyds, Limited, closed down a week ago one of its five blast furnaces, while short-time working came into operation last week at the Sheepbridge Company, Limited, Chesterfield.

The moves are the latest in the series of production cuts in the iron and steel industry, which, last month, was estimated to be working at only 80 per cent. of capacity.

At Stanton Ironworks, other jobs within the works are to be found for the 35 men affected. At the Sheepbridge Company, 40 men a week will be on short time for an unspecified period.

Due to a falling-off in demand for heavy plates, the South Durham Steel & Iron Company, Limited, is to reduce further the number of shifts at its West Hartlepools rolling mills from 17 to 12 a week, and the working week from 42 hours to 32 hours. Only a small number of men will be involved in the change.

New Swedish Foundry

The following describes a recently constructed Scandinavian foundry producing at the rate of 10,000 tons of castings per annum. The introduction of purely-mechanical control over many of the processes has enabled the number of operators to be reduced to about a tenth of those previously employed to produce the same volume of work and hence reveals the potentialities of automation trends as applied to the foundry industry.

What is claimed to be one of the world's most modern foundries for producing castings for heating boilers was recently put into operation at the Norrahammar Works, near Jonkoping, Sweden, a division of the engineering firm of Husqvarna Vapenfabriks AB. Known as the "Norah Transfer," it is reported that this highly-automated "push-button" plant (Fig. 1) requires a staff of only eight to 11 for turning out the same volume of products as was previously produced by some 50 employees, and has called for investment of Kr. 4,500,000 (£310,315).

The new plant incorporates the three basic foundry operations of moulding, pouring and shakeout and a detailed sketch showing the layout scheme for performing these various operations is shown in Fig. 2. Used in conjunction with a previously-completed automatic sand-mixing unit, the plant has an annual output capacity of about 10,000 tons of castings on single-shift operation, or 950 tons per year per employee. This means an almost 10-fold increase in output per man/year compared with 1937.

The running of the plant is supervized from a control panel, two men being responsible for this, while the stations for (*a*) placing of cores, (*b*) pouring, and (*c*) handling of the castings are each served by two or three men.

Plant Details

One double rubber-diaphragm machine carries out all the moulding automatically and presses the sand into the flasks at a pressure of 140 tons (100 lb. per sq. in.). The large flasks (66 copes and 73 drags) circulate around the plant at a speed of five to six circuits per day at full operation. Both the turnover and the closing of the flasks are carried out automatically and the cores are placed by manually-controlled fixtures. At the pouring station a weight of 1½ tons is placed on each mould, whereupon the pouring is done manually with the help of an electric overhead conveyor. A complete mould requires 1.5 cu. m. (about 53 cu. ft.) of sand and the sand-mixing plant has a capacity of 90 to 100 cu. m. per hr. At maximum operational speed, the same sand is used three times per day.

After pouring, the flasks pass through a cooling tunnel before they arrive at the shakeout station, where sand is removed and the castings are then transported to the cleaning shop.

Dust and Fume Elimination

When designing the new foundry, much attention was paid to the elimination of dust and fumes particularly in the shakeout and during cooling, when carbon-monoxide is usually present. In the

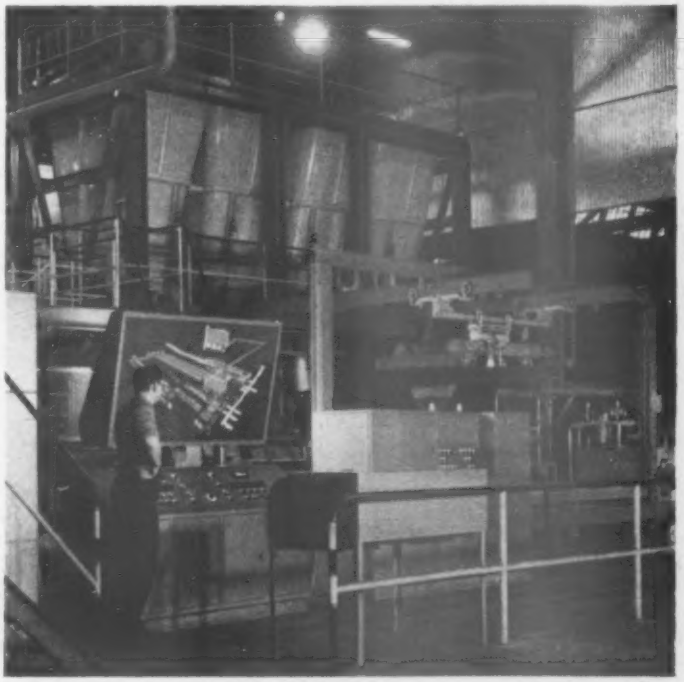
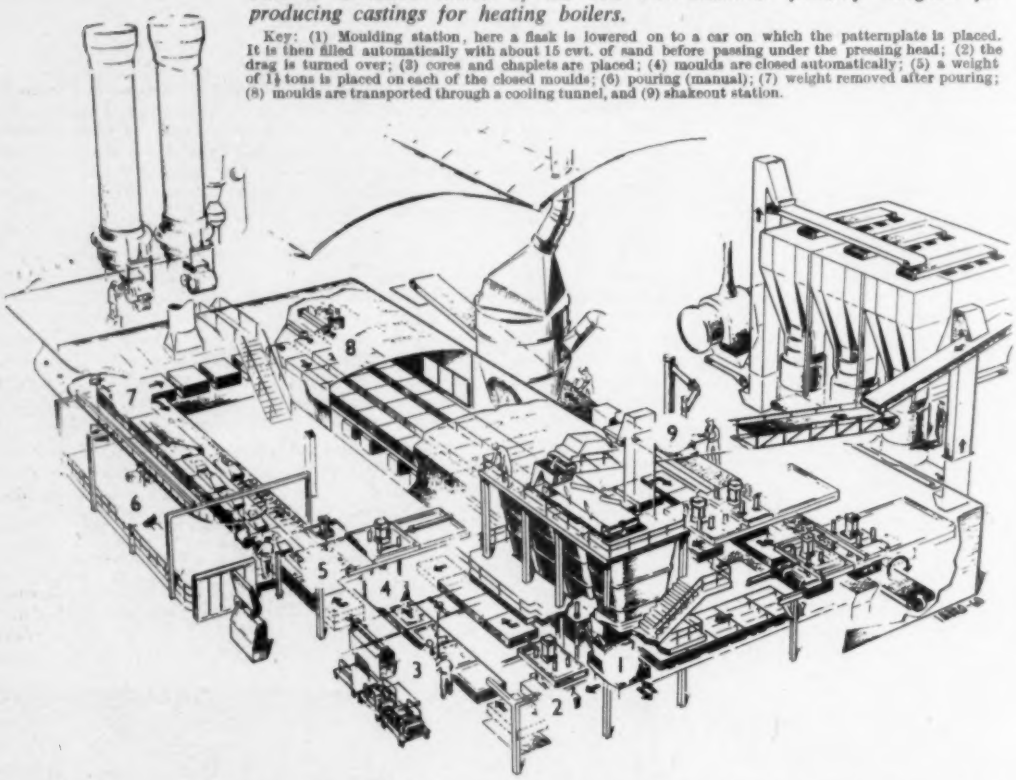


FIG. 1.—*Swedish Husqvarna group's new "Norah Transfer" plant; note the control panel in the foreground.*

FIG. 2.—*Detailed sketch of the new Norrahammar foundry designed for producing castings for heating boilers.*

Key: (1) Moulding station, here a flask is lowered on to a car on which the patternplate is placed. It is then filled automatically with about 15 cwt. of sand before passing under the pressing head; (2) the drag is turned over; (3) cores and chaplets are placed; (4) moulds are closed automatically; (5) a weight of 1½ tons is placed on each of the closed moulds; (6) pouring (manual); (7) weight removed after pouring; (8) moulds are transported through a cooling tunnel, and (9) shakeout station.



Norrahammar plant, the two shakeout machines (one used for copes and the other the drags) are fully automatic. A total of 7,000,000 cu. ft. of air and gas is blown out of the plant per hr., of which 2,240,000 cu. ft. contain solid particles. This is passed through a wet-type filter which absorbs about 98 per cent. of the solid particles. The new foundry has been arranged with a view to handling the usual large sizes of boiler sections in the main production runs. The plant has been designed by the company's own engineers using primarily Swedish equipment, with the exception of the foundry unit which was supplied by the American Taccone Corporation. "Norah Transfer" is reported to have resulted in higher quality castings, less scrap and closer casting tolerances.

BS. for Zinc Coating

A revised British Standard specification for zinc coatings on iron and steel articles (B.S. 729:1961), part 1, hot-dip galvanized coatings and part 2, sherardized coatings has now been issued. The earlier standard specified visual examination and Preece copper-sulphate-dip continuity test for coatings, while the revised standard introduces requirements, in part 1, for weight of coating in addition, giving three alternative methods of determination. Guidance is given on how to deal with threaded work and an accepted procedure is indicated. In part 2, visual examination and the copper-sulphate dip test alone are specified. Again, recommendations for threaded work are included. Copies of the standards may be obtained from the British Standards Institution, Sales Branch, 2, Park Street, London, W.1; part 1, price 4s.; part 2, 3s.

W. Shaw plans New Steel Foundry

It was announced on Wednesday, August 16, that W. Shaw & Company, Limited, of Middlesbrough, have plans for the provision of some of the most modern steelfoundry plant in the world. New buildings are to be erected for steelfoundry production at the Forty Foot road Middlesbrough works. The site is at present occupied by its iron foundry trading under the name of J. & R. Ritchie, which means that production of cast-iron pipes and specials will gradually cease; orders on hand will, however, be completed.

Plans have already been laid before Middlesbrough Planning Committee and, if permission is granted, it is anticipated that a start will have been made on the work by early next year and that it will take approximately two years to complete. Provision of a separate foundry for high-alloy steels is included in the scheme.

Equipment and Supplies

Shell-moulding and -coremaking—Multiple-unit Machine

Polygram Casting Company, Limited, Shernfold Park, Frant, Tunbridge Wells, arranged a demonstration this week of their new multi-station automatic shell-moulding and -coremaking machine. Claimed to be revolutionary in design, a feature of the machine is that its quite large output of moulds or cores—or both together—can be achieved with the labour of only two men. The machine will handle coreboxes up to 28 by 18 by 12-in. deep, and is reported to be capable of producing cores from these at the approximate rate of 100 per hr.—smaller cores being produced from multi-impression coreboxes at an equivalent multiple rate. Two shell halves are produced at each of up to six stations, and hence under normal production conditions, shells should be produced at the rate of 200 per hr.

Basic Arrangement

Basically, the machine embodies a single fixed blowing head served by one or more (indexing) manipulator units—several of which can be accommodated. The equipment arranged for demonstration purposes actually incorporates six manipulator stations, mounted radially, at 60 deg. intervals, on a turntable 12-ft. dia. The latter is power driven by a special indexing device for which rigid construction, positive locking and smooth motion are mentioned as features. Power services are fed to the table through a central bearing and a total of 120 kw is available, allowing a maximum of 20 kw at each manipulator station, though consumption will normally be well below this figure.

Manipulators: These are 3-ft. 8-in. high, of unit construction and need no foundations it is stated. The

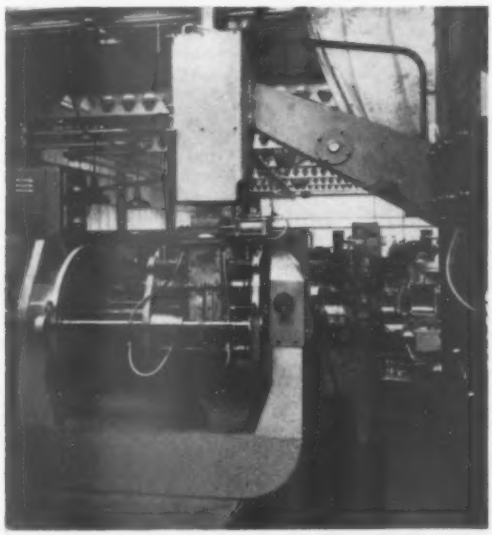
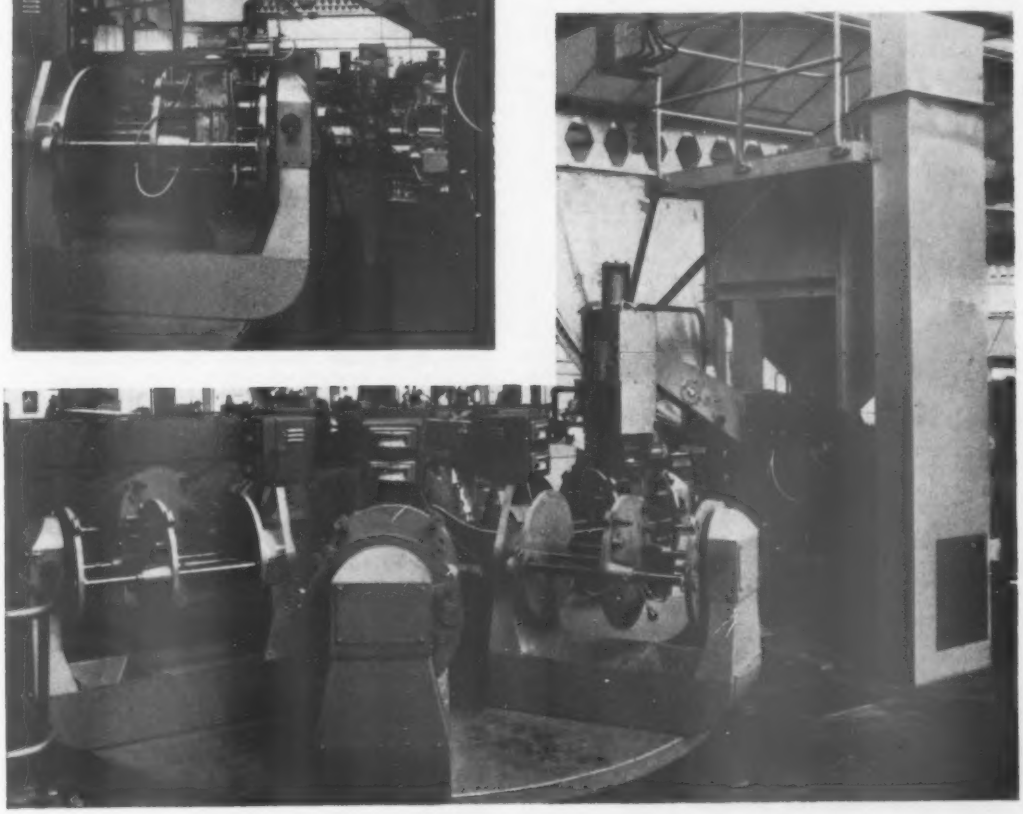


FIG. 1 (*left*).—*Blowing head of the new Polygram shell-moulding and -coremaking unit with one manipulator station indexed below it.* FIG. 2.—*General view of the complete set up for a six-station machine, the manipulator units (shown here without coreboxes) being carried on a turntable around the blowing head.*



Equipment and Supplies

pattern equipment (or corebox) is mounted between two pressure-plates, the outer one fixed and the second one sliding along two parallel guide rails, actuated by a horizontally-mounted air-cylinder. The spring-controlled ejection system is such that a core is first released from the half-box mounted on the fixed pressure-plate, and is not ejected from the other half until the withdrawal stroke of 16-in. is completed. An electrical control-panel is incorporated closely to regulate corebox and patternplate temperatures.

Blowing Head: Moulds and cores are blown from a new design of blowing head for which it is claimed that although compressed air is used as the motivating agent, the sand emerging from the head is almost free of air, turbulence being virtually eliminated and venting dispensed with in many cases.

Operation: In operation, each manipulator is indexed successively beneath the blowing head, the head is pneumatically clamped and immediately fills the cavity under the desired blowing pressure. After a predetermined time, the head retracts; the manipulator then inverts through 180 deg. to expel the excess coated sand (and can be made to rock); the table meanwhile can be indexed to the next station and then successively through stations three, four and five. As the sixth station is approached, the pressure plates of the manipulator automatically separate, actuating the ejection mechanism. An operator is stationed at this point to remove the ejected shell or cores and then to depress the valve to index the table to the next station.

Excess resin/sand is collected by chute—situated between the blowing point and the following station—and conveyed on a rubber belt from which it is fed into the boot of an elevator. A floor-grid positioned over this belt conveyor also allows new sand to be fed into the system. The elevator lifts the sand and discharges it into a hopper, the sand first passing through a vibrating screen to remove any pieces of partially-invested material. From the hopper, resin/sand is fed into one of two chambers, these being pressurized one at a time. The pressurized chamber feeds sand into the head at a rate commensurate with that at which sand can be discharged from it and then as one container is emptied, a transfer valve is operated, reversing the functions of the chambers. The second operator required on the unit is stationed at this point to control the sand system.

Don't mess about with Electricity!

In summing up for the jury at an inquest on a foundryman who was unfortunately electrocuted, the Coroner was reported in the Press to have said—"It is commonsense, you don't just mess about with electricity." The manager of the foundry in which the victim worked, in referring to the sand-mixing machine which caused the accident, said that the machine could not be switched off at the main, it was not earthed, and its connection without fuses was only a temporary measure. The motor-driven sand-mixer was apparently made by the manager who admitted that he was not a qualified electrician, and the District Commercial Engineer of the Yorkshire Electricity Board explained to the court that the cable was not really suitable for heavy industrial work and there were no signs of it either being connected to a plug or earthed. The jury in returning a verdict of death by misadventure added a rider "that even temporary electrical installations should always be carried out by competent persons."

The National Inspection Council for Electrical Installation Contracting (10/13, Bedford Street, London, W.C.2), has issued the report—of obvious significance for readers of this JOURNAL—to draw attention to the services offered by their members. It forms yet another example of the need to call in experts in a particular industry when safety precautions are to be considered. The NICEIC report continues:—

Electricity is a good servant, but can be dangerous when misapplied or used without due care. The wise employer relies on the services of a competent electrician, such as those employed by a firm of electrical contractors on the roll of approved electrical contractors maintained by the National Inspection Council for Electrical Installation Contracting, whose work has not only been inspected before enrolment, but is subject to inspection at any time thereafter by inspecting engineers on the staff of the National Inspection Council. Such contractors can be recognized by their NICEIC badge and lists of approved contractors can be seen on request at any Electricity Board showroom or service centre, and in some libraries of Chambers of Commerce and local authorities.

Thermometer

A bi-metal thermometer—the Zero Re-set—produced by the British Rototherm Company, Limited, Merton Abbey, London, S.W.19, has been designed so that it can be re-calibrated without calling in a skilled technician. At the lower back of the vertical head of the thermometer is a countersunk instrument screw stamped "Rs—Re-set." To re-calibrate the thermometer, the screw is removed and two turns of a 2 BA Allen key will loosen the locking screw and allow the thermometer stem to be rotated. This rotation moves the pointer and allows adjustments of up to 50 per cent. of the scale range. A stop is incorporated in the locking device which it is stated makes it impossible to damage the instrument. The thermometer is at present available with 2½, 4, and 7-in. dials in the vertical pattern in standard temperature ranges, and horizontal patterns will be available shortly.

Compressor-output Tester

Alan Munt & Company, Limited, Heston Airport, North Hyde Lane, Hounslow, Middlesex, are manufacturing a compressor-output tester (designed in accordance with BSS. 726/39) which can be used to measure output and also check pressure gauges. The tester consists of a nozzle fitted at one end of a steel body, the other end being screwed to fit on to the off-take cock; a pressure-gauge and a thermometer are fitted to the body of the tester. Two nozzles are provided, the $\frac{5}{16}$-in. dia. size covering the range 54 to 148 cu. ft. per min., and the $\frac{7}{16}$-in. dia. nozzle for from 90 to 290 cu. ft. per min. A blank plug is also supplied so that when fitted in place of the nozzle and the off-take cock is opened, the pressure gauge on a machine can be checked against that on the tester.

Lubricants: To foundrymen requiring supplies of and information about safe lubricants for use when handling oxygen, Omni (G.B.), Limited, of 35, Dover Street, London, W.1, announce that they are distributors in this country of Fluorolubes and offer copies of *Bulletin* No. 42 entitled "Fluorolubes—Safe Lubricants for Oxygen Equipment; Technical Report to the Oxygen Industry."

Iron Castings Production in 1960

Production of iron castings in the second quarter of this year was 1,007,000 tons, which compares with 1,026,000 tons in the previous quarter, and 1,006,000 tons in the second quarter of 1960. District production figures, released by the Iron and Steel Board, are shown in Table 1.

TABLE 1.—*Production of Iron Castings, by District.*

District.	Iron Castings (tons).	
	Second quarter, 1960.	Second quarter, 1961.
Eastern, South-Eastern (incl. London), Southern and South-Western	118,140	116,210
Midland	221,010	219,640
North Midland	213,390	200,480
East and West Ridings	90,370	95,380
North-Western	96,460	100,390
Northern	110,090	111,580
Scotland and Northern Ireland	93,240	101,030
Wales	63,610	62,320
Total	1,006,310	1,007,030

Commenting on the Iron and Steel Board's figures, the Joint Iron Council draws attention to the fact that the Easter and Whitsun holidays both fell in the second quarter of this year, the effect being to reduce the number of working days by between two and three per cent. Thus the reductions in output of this order do not imply reductions in the rate of production. The JIC states that in fact the rate of production has been generally well maintained, and such changes as are recorded for the different sections of the industry are marginal.

In the automobile iron foundries there was again improved performance although it still fell somewhat short of the high peak of the corresponding period of last year; this section benefited greatly from the firm demand for commercial vehicles and tractors. The engineering section edged forward under the influence of the high investment demand for plant and machinery, and the building section while maintaining an output above that of the corresponding period last year, failed to equal that of the previous quarter, mainly as a result of a slight easing in demand for domestic equipment. There was a slight lessening in demand for ingot moulds, but the rate of production for pressure-pipes and castings for railway equipment was well maintained compared with the previous quarter, although that of pressure-pipes was significantly down on the corresponding figure of a year ago.

TABLE 2.—*Output of Iron Castings, by Section.*

Section.	Second quarter, 1961.	Percentage change.	
	(Thou. tons).	Previous quarter.	Second quarter 1960.
Automobile (including tractors)	189.0	+ 1.4	− 6.3
Engineering (*a*)	340.5	− 0.5	+ 6.0
Building and domestic (*b*)	142.2	− 5.8	+ 3.0
Pressure-pipes (*c*) and fittings	134.0	− 1.0	− 8.1
Ingot moulds (*d*)	128.6	− 6.9	− 4.6
Railway equipment	72.7	− 0.4	+12.2
Total	1,007.0	− 1.9	+ 0.1

(*a*) Including machine-tool, textile machinery, electrical, shipbuilding, etc. (*b*) About 1/5 of the total consists of castings for domestic goods, *e.g.*, stoves, cookers, refrigerators, etc. (*c*) Mainly gas and water. (*d*) Mainly for the steel industry.

Output of iron castings in the quarters under review is detailed in Table 2, the statistics relating to both grey and malleable iron castings and output being classified according to use.

Labour

The number employed in the ironfounding industry at the end of June was 130,700, which is 1,100 fewer than three months ago but 800 more than at the end of June last year.

Ambulance Facilities in Factories

Draft Regulations*, published by the Ministry of Labour on August 22, require occupiers of certain factories and other premises in Great Britain to nominate a responsible person to be always available during working hours to summon an ambulance. The premises to which these Regulations apply are blast furnaces, copper mills, iron mills and foundries, metal works, saw mills and factories in which articles of wood are manufactured, in any of which 500 or more persons are employed, and all chemical works. They replace a requirement under the Factories Act, 1937, that occupiers of factories shall provide and maintain an ambulance unless they have made arrangements for one to be obtained.

* Draft Blast Furnace and Saw Mills Ambulance (Amendment) Regulations, 1961, H.M. Stationery Office, price 3d. net, and the Draft Chemical Works Ambulance (Amendment) Regulations, 1961, H.M. Stationery Office, price 2d. net.

Bauxite in Sierre Leone

Following the discovery of bauxite in the Mokangi Hills in the Moyamba District last year, Barclays Bank D.C.O. reports from Sierra Leone that a subsidiary company of the Swiss company, Aluminium Industrial A.G., has been formed. This is the Sierra Leone Ore and Metal Company which has submitted a draft agreement to the Government for consideration, and is at present erecting prefabricated houses on their prospecting area near Kangahun, in the Moyamba District. In addition, a hydrographic survey is being started in the Bonthe area in order to find out the depth of the river for the purpose of shipping bauxite. During the course of prospecting, in which about 250 drill holes were sunk, large quantities of ore were shipped to Germany for washing trials so as to determine the most suitable washing plant to be installed in Sierra Leone, to produce a high grade ore for export.

Bulgarian Foundry Technology

The July issue of *Mashinostroene*, the Bulgarian journal, contains two articles of particular interest to foundrymen. One, by H. Walter, is entitled "Use of High-frequency Heating in Drying Foundry Cores," and the other by T. Stanev is entitled "Possibility of Reducing the Manufacturing Process of Steel by utilizing Complex Deoxidizers." In the latter, the author describes certain methods relatively new in Bulgaria and explains the economics of melting steel by the use of electricity. The tests described in the article were carried out at the Stalin Plant in Dimitrovo and in Kolarovgrad. Information is given about the theoretical data of complex deoxidation; the selection of oxidizers and results and conclusions from the tests carried out are also given.

Personal

Mr. E. J. ROBINSON has been appointed a director, and Mr. R. F. N. OTWAY, manager-Europe, of Head Wrightson Export Company, Limited.

Mr. J. M. BRICE, Mr. H. A. CHAMBERS and Mr. H. ROCKWELL have been appointed to the board of the Rockwell Machine Tool Company, Limited.

Dr. FRANZ H. HENSEL, until recently vice-president of engineering of P. R. Mallory and Company, Inc., Indianapolis, Indiana, has joined the Clyde Williams and Company, Columbus Ohio.

Mr. STANLEY M. THORNLEY, F.C.A., has been appointed commercial director and Mr. IAN C. SMITH, B.SC.(METALLURGY), technical director, of Richard Baxendale & Sons, Limited, Bamber Bridge, Lancs.

Sir DOUGLAS BRUCE-GARDNER, a director of Guest, Keen & Nettlefolds, Limited, and G. K. N. Steel Company, Limited, has been appointed to the board of Guest Keen & Nettlefolds (South Wales), Limited.

Mr. C. O. B. WRAITH has been appointed financial director of A. A. Jones & Shipman, Limited, Mr. E. WATTS has been appointed secretary of the company in place of Mr. Wraith who has relinquished that position.

Mr. W. J. CROCKETT has been appointed chairman of Wright & Platt, Limited, patternmakers, Birmingham, and will continue as managing director of the associated companies, Robinson & Knee, Limited, and C.L. Developments, Limited.

Mr. P. L. MCILMOYLE has been appointed assistant manager, purchasing department of Castrol, Limited. Mr. McIlmoyle, who is 28, joined Castrol in 1954 as a research and development chemist and transferred to the purchasing department in 1960.

Mr. L. S. CARSTAIRS, Sir NORMAN HULBERT, Mr. J. D. BRAYLEY and Mr. W. J. DARBY have been appointed to the board of Barrow Haematite Steel Company, Limited, a subsidiary of Arusha Industries, Limited. Mr. C. W. KLEFT has ceased to be a director.

Mr. J. M. HARRISON has been appointed chairman of Peglers, Limited, brassfounders, Belmont Works, Doncaster. Mr. JOHN EMBERTON, son of Mr. A. E. Emberton, the retiring chairman, and Mr. ERNEST WEBSTER, sales manager, have been appointed directors.

Charles B. Pugh (Walsall), Limited, announce the retirement of the chairman, Mr. V. FARROW. His son, Mr. V. R. FARROW, joins the board and is also the secretary of the company. A third member of the board who is to join Mr. E. W. PUGH, who is now chairman, is Mr. A. E. HILL.

Mr. BRIAN M. LEE, director and manager of the industrial division of Belling-Lee, Limited, has been appointed the company's assistant general manager. Mr. J. W. F. GOLLEY, general works manager, has become works director and Mr. J. R. TURRILL has joined the company as sales manager.

Mr. R. O. KELLY has been appointed works manager, Bradford works, of International Harvester Company of Great Britain, Limited, as from September 1. He replaces Mr. SVEN SONANDER who has become works manager at the Norrkoping Works of A.B. International Harvester Company of Sweden.

Mr. F. J. HOWARD has relinquished the post of works manager and technical director of Globe Pneumatic Engineering Company, Limited, of Romford, to concentrate on design. Mr. A. G. OSBORN has been appointed works manager and Mr. W. HOGARTH becomes assistant works manager (admin.).

Mr. N. C. LAKE, deputy managing director, Head Wrightson & Company, Limited, has been appointed chairman of the North East Regional Council of the British Institute of Management to succeed Mr. BRYAN R. SCHOLES, chairman and managing director, Heywood-Helliwell, Limited, who now becomes a vice-chairman.

Mr. JAMES HODGE, M.A., M.I.MECH.E., chief engineer of the Holman group of Camborne, Cornwall, has been invited to lecture on rotary-screw compressors at an International Symposium on Compressors, organized by the Council of the Czechoslovak Scientific and Technical Society, to be held in Prague, September 6 to 8.

Mr. T. H. R. PERKINS has been appointed assistant managing director of F. Perkins, Limited, and continues as marketing director of the group. Mr. D. F. W. MCNAIR becomes deputy director of marketing. Mr. J. M. COLLINS, a director of Perkins Engines, Limited, has been appointed general manager of the Perkins group's sales division. Mr. H. LYMATH succeeds Mr. McNair as group project co-ordinator.

Mr. R. M. BATEMAN has been appointed chairman of British Industrial Plastics, Limited, in place of the late Mr. C. H. GLASSEY. Mr. Bateman, who is deputy chairman of Turner & Newall, Limited, was appointed to the board of BIP last May. Dr. W. BLAKEY, a joint managing director of BIP, has been appointed deputy chairman of that company. (Earlier this year Turner & Newall acquired the ordinary capital of BIP).

The following have been appointed to the aero division of Rolls-Royce, Limited: Mr. T. L. METCALFE, senior project engineer, Conway; Mr. N. DENTON-HUGHES, chief sales engineer; Mr. J. K. BHORE, sales project manager, civil engines; Mr. S. WROATH, sales project manager, military engines; Mr. L. F. MANSER, export sales manager; and Mr. J. R. MURCH, manager (administration and services)—quality and inspection department.

Mr. GORDON B. COLEMAN, the principal of Brazilian Trade Consultants of Sao Paulo, Brazil, is at present in this country and is staying at 17, Farm Avenue, North Harrow, Middlesex ('phone, Field End 9951). The objective of his visit is to meet industrialists interested in opening up business with the South American market, in particular in Brazil. Mr. Coleman is in a position to advise on the appointment of agencies or the creation of manufacturing facilities.

Mr. R. P. BROOKES is to become chairman of Joseph Sankey & Sons, Limited, on October 1. He will replace Mr. H. F. HODGSON who is retiring from the position and as managing director on September 30. Mr. Hodgson will continue as a director of the company and also as a director of the parent company, Guest Keen & Nettlefolds, Limited, and other G.K.N. group companies. Mr. Brookes, a director of the parent company, and chairman of Garringtons, Limited, and other G.K.N. companies, has been a director of Joseph Sankey for the last two years. Mr. G. B. SANKEY, at present assistant managing director of Joseph Sankey, becomes managing director with effect from October 1.

Calcium Carbide Storage*

Increasing incorporation of non-traditional materials into foundry processes renders it incumbent on foundrymen to learn and apply safety precautions inherent in the use of the materials adopted. A case in point is the use of carbide of calcium for injection processes. Here founders should study, for example, safe storage methods for carbide as developed by the welding industry.

They would learn that the storage of calcium carbide is governed by a number of Acts and Statutory Rules and Orders (available from HMSO), because if the carbide is allowed to come into contact with water, acetylene (an explosive gas) is produced. Thus, carbide in quantities in excess of 28 lb. may only be stored if a licence has been obtained from the local authority. For quantities less than 28 lb. in weight, the following requirements (reproduced from S.R.&O. 1929, No. 992) must be fulfilled:

(i) Up to 5 lb. of carbide of calcium may be stored so long as it is kept in separate hermetically-closed metal vessels containing not more than 1 lb. each.†

(ii) 28 lb. of carbide may be so kept so long as the following conditions are observed: (a) The carbide shall be kept only in a metal vessel or vessels hermetically-closed at all times when it is not actually being placed in or withdrawn from such vessel or vessels; (b) the vessels containing carbide shall be kept in a dry and well-ventilated place; (c) due precautions shall be taken to prevent unauthorized persons from having access to the carbide, and (d) notice shall be given of such keeping to the Local Authority."

Accidents with carbide which involve personal injury must be reported to the Secretary of State (Home Office). Premises licensed for the storage of carbide must, by law, post a notice setting forth the conditions attached to the licence which have to be observed by employees.

General Information

Carbide is supplied in sealed drums and these should always be used for storing prior to use. The chief concern in storing carbide is to keep it completely dry and the store must always be situated under cover so as to protect the drums from rain. The storeroom should be suitably ventilated to prevent any accumulation of acetylene which might inadvertently be produced. Any dry, well-ventilated building may be used, but if adjoining the foundry or other building, it should be made sure that the party wall is fireproof. The ventilation of the store is of paramount importance and must be provided through the roof.

The carbide should be stored on a platform raised above the floor level so as to ensure circulation of air beneath the drums. The drums of carbide should only be opened immediately prior to use for charging the dispensing unit and a special opener provided should always be used. A hammer and chisel must not be used because of the risk of an explosion. It is dangerous to leave carbide drums exposed to rain; moreover, drums which have been rolled through rain or even through surface pools of water are liable to explode when opened. A prominent notice should be posted on the store as follows: "Calcium Carbide —No Naked Lights or Smoking in the Building." In the case of fire, water must never be used to extinguish it; buckets of sand should be kept for the purpose.

* Partially extracted from an article "Safety in Welding Processes," available in cyclostyled form from HM Factory Inspectorate (Engineering Branch), 19, St. James's Square, London, S.W.1. The article also includes safe-working recommendations for use when welding and cutting, of interest particularly to steelfounders.

† These regulations apply also of course to the storage of calcium carbide to be used for the "Speedy" moisture testing of sand.

Safe-working Hints

The British Safety Council has issued from Safety House, 60, Westbourne Grove, London, W.2, a number of hints on safeworking practices, most of which are applicable to foundrywork, *viz.*:—

* * *

A BAD WORKER blames his tools, but tools in bad condition can injure the best worker. Only tools designed for the job should be used, and they must be kept in good condition and put away after use. Tools with damaged handles, damage handlers.

* * *

THE LAW requires protective clothing to be worn for many jobs in industry. These requirements are for the benefit of the worker and should not be poohpoohed. Gloves, helmets, goggles, spectacles and shoes can easily be replaced—but new hands, heads, eyes and feet are more difficult to come by.

* * *

NEVER oil or adjust machinery whilst it is in motion. Switch off before you start working on it, and if possible "lock" it out. Make sure before switching on that everyone is clear.

* * *

OPERATORS should never stand beneath loads which are being hoisted. The only person allowed near during craning, hoisting and lifting operations, should be the crane-driver's signalman.

* * *

DON'T CROSS a conveyor or chute except by the proper bridges, and don't stack more on the belt than the conveyor can adequately carry. Guards should not be removed to take off the load. Conveyors are provided to carry goods, not humans.

* * *

WIRE ROPES should not be pinched or kinked, and they shouldn't be shortened by tying knots. When using wire rope, get the correct length and don't stand in the bight. Gloves are an added precaution when handling ropes of all kinds.

* * *

FIRE is one of the greatest dangers in the factory—to life and material. Workers should know on the first day of their employment where all fire alarms and fire fighting equipment is situated, and where the exits and escape exits are. If there is fire, cluttered aisles and passageways can mean the difference between life and death.

* * *

LOADS ON FORK-LIFT TRUCKS should be kept at a reasonable height to ensure the driver has clear driving visibility. Passengers should not be carried, and fast show-off driving should be immediately stopped.

* * *

PACKAGES should not be carried by string or steel bands. Cut hands can result. Extreme care should be exercised when cutting wire or steel bands which fly at fast speeds. Nails in boxes and packages should always be knocked well down. Many hands and fingers are torn by protruding nails.

* * *

NEVER remove the guard of a machine while it is operating, you will be breaking the law, as well as endangering yourself. If for any reason the guard has to be removed, always switch off and lock out machinery.

* * *

SPEED causes accidents to riders, drivers and walkers; falls account for a large percentage of industrial accidents, so walk and get there.

British and World Shipbuilding

Lloyd's Register Returns for June Quarter

Steamships and motorships of over 100 tons gross under construction in Great Britain and Northern Ireland at the end of June, according to Lloyd's Register shipbuilding returns, totalled 241 ships of 1,614,062 tons gross. This was 3,415 tons more than in the previous quarter, apart from which it is the lowest figure since December, 1945. The highest post-war figure was 2,345,408 tons at the end of 1957. The total comprises 96 ships of 623,404 tons fitting out afloat, and 145 of 990,658 tons still to be launched.

Commenced during the quarter were 57 ships of 341,092 tons; launched, 72 of 375,353 tons; completed, 64 of 341,918 tons. Vessels under construction included 38 steamships of 778,346 tons and 203 motorships of 835,716 tons. In Commonwealth countries there were under construction six steamers of 64,662 tons and 46 motorships of 141,095 tons. Oil tankers total 40 ships of 782,963 tons, which is 61,042 tons less than the March quarter, and represents 48.5 per cent. of the total tonnage under construction in this country.

Total construction in the principal districts is shown in the Table.

TABLE 1.—*Shipbuilding Construction in Hand in Principal Districts of Great Britain and Northern Ireland.*

District.	June 30, 1961.		March 31, 1960.		June 30, 1960.	
	No.	Gross tonnage.	No.	Gross tonnage.	No.	Gross tonnage.
Aberdeen ..	11	8,265	13	13,710	10	9,236
Barrow ..	3	84,500	2	51,500	3	92,500
Belfast ..	9	135,500	12	228,189	12	217,762
Bristol ..	2	2,250	1	2,000	4	2,830
Clyde:						
Glasgow ..	41	341,618	47	323,179	51	464,720
Greenock ..	18	118,002	17	126,236	18	128,728
Dundee ..	3	9,400	3	12,400	4	22,744
Hartlepool ..	1	9,200	2	19,600	2	22,250
Hull	37	14,742	42	15,830	36	14,753
Leith	8	36,085	8	42,590	7	43,050
Liverpool ..	8	99,080	7	98,630	7	130,045
Middlesbrough	8	143,655	8	144,530	9	163,610
Newcastle-upon-Tyne	29	325,777	29	303,020	32	323,580
Southampton	4	2,875	6	7,263	11	10,979
Sunderland ..	25	275,790	22	214,654	23	214,114

Sizes of steamships and motorships under construction at the end of June in Great Britain and Northern Ireland included the following:—100 to 500 tons, steam nil (motor 86); 500 to 1,000 tons, steam nil (16); 1,000 to 2,000 tons, steam 8 (17); 2,000 to 4,000 tons, steam 2 (2); 4,000 to 6,000 tons, steam nil (13); 6,000 to 8,000 tons, steam nil (13); 8,000 to 10,000 tons, steam nil (25); 10,000 to 15,000 tons, steam 5 (24); 15,000 to 20,000 tons, steam 1 (6); 20,000 to 25,000 tons, steam 3 (1); 25,000 to 30,000 tons, steam 5 (nil); 30,000 and under 40,000 tons, steam 11 (nil); 40,000 tons and above, steam 3 (nil).

Apart from China, East Germany, and Russia (USSR) from which countries no returns are available, there are under construction in the world 1,500 steamships and motorships of 8,798,483 tons, of which 18.3 per cent. is being built in Great Britain and Northern Ireland. The June total is 72,622 tons more than in the March quarter.

Of the steamships and motorships under construction throughout the world at the end of June, 4,351,727 tons (49.5 per cent.) are to be classed with Lloyd's Register. Of this total 1,549,891 tons, representing 96.0 per cent. of the tonnage being built there, are at yards in Great Britain and Northern Ireland.

Law Case

Burning of Waste blamed

A case which might equally well have arisen in a foundry had repercussions in Court on Friday (August 18) when Shipmans (Sheffield), Limited, steel and wire manufacturers, were fined £10 in Sheffield for an offence under the Clean Air Act. They pleaded "Not Guilty" and it was conceded that they had been granted an exemption certificate under the Act. The Magistrates were told, however, that the certificate did not give automatic exemption if the furnace was not properly maintained and used.

A smoke inspector of Sheffield's Clean Air Committee, Mr. R. Thompson, told how he kept observation on a low brick-built chimney at the firm's Attercliffe works for half an hour during which black smoke was emitted for 10 minutes. After inspecting the furnace he said he found the fire was bright and clear, and the coal in good order and uncontaminated, but around the door of the furnace he observed partially-burnt oily waste. For Shipmans, Mr. A. Ashton said the firm made proper provision for the burning of oily waste, but it was evident that workmen had put waste into the furnace.

Industrial Films

The following new films are now available on loan from the Central Film Library, Government Building, Bromyard Avenue, Acton, London, W.3, free of charge or on terms stated:—

An Introduction to Comminution (UK2184). (three reels, running time 32 min.). A colour film showing the principles, development and modern practice of reducing ore, rock, and similar mined or quarried raw materials to powder, and produced by International Combustion, Limited.

The Grievance (C484) (three reels, running time 30 min., hiring charge 15s.). A Canadian film dealing with the case of a worker who was demoted for refusing to carry out a job under conditions, in his view, of excessively high temperature. The grievance is followed through several stages of negotiation, between union and management, to its final settlement.

Introduction to Jet Engines (C543) (one reel, running time 13 min, hiring charge 10s.). A colour film made by the Royal Canadian Air Force showing the basic principles of rocket and jet-propulsion demonstrated by animated drawings.

Latest Foundry Statistics

Copper-base Alloys: The August *Bulletin* of the British Bureau of Non-Ferrous Metal Statistics places the output of copper-base castings during the month of June at 7,438 tons. For the first half of 1961, production was 43,038 tons, compared with 43,977 tons for the same period in 1960.

Steel Castings: The following figures are given in the July issue of the *Bulletin* published jointly by the Iron and Steel Board and the British Iron and Steel Federation. The average weekly production of steel castings during June was estimated at 6,200 tons, 300 tons more than in May, and 600 tons more than a year ago. A census of employment taken on June 10 showed that the industry was staffed by 18,800 people, 20 more than in May and 810 more than a year ago.

ATTEND at once to any kind of injury, even a minor cut. Infection can spread rapidly in factories and a small cut can soon lead to a nasty sore.

News in Brief

THE AIRCRAFT CARRIER, GLORY, which was placed in reserve at Rosyth about five years ago, is to be broken up at the shipbreaking yard of Thomas W. Ward, Limited, at Inverkeithing, on the Forth.

ASHTON-UNDER-LYNE COUNCIL has turned down an application by the Ryecroft Engineering Company, Limited, to erect a single-storey building for die-casting at their works in Ryecroft Street.

THE NORTH WEST BRANCH of the Institute of Metal Finishing is organizing a Students' Competition for the 1961/62 session. Details are available from Mr. F. Spicer, Suffield Cottage, Moorhead, Gildersome, Leeds.

KITTEL & COMPANY, LIMITED, for many years at 5, Fenchurch Street, London, E.C.3, have removed to 7/8, Poultry, London, E.C.2 ('phone: CITY 1018/9). The company also announces that Mr. W. J. F. Peterson has resigned from the Board.

A NEW ELECTRICALLY-OPERATED FURNACE, of nine to ten tons capacity, was commissioned on August 15 in the foundries of F. Parramore & Sons, Limited, Chapeltown, by the chairman, Mr. Alfred Parramore. A year ago a similar furnace was commissioned by the company.

CHARLES CONNELL & COMPANY, LIMITED, Glasgow, have received an order from the Charente Steam Ship Company, Limited, for a cargo motorship of 8,850 tons gross. The vessel will be 460 ft. long, 63-ft. broad, and 38¼-ft. deep, and will be fitted with a Sulzer diesel engine.

A RUMOUR that there would be redundancy among the 1,100 employees at the Penistone factory of David Brown Foundries, Limited, where about 100 employees are on a four-day week, has been officially denied. The men have been transferred to other departments, most of which are working normally.

A CONFERENCE on "International Developments in Heat Transfer," arranged by the Institution of Mechanical Engineers, American Society of Mechanical Engineers, and Institution of Chemical Engineers, is to be held at the Lecture Hall, Central Hall, Westminster, London, S.W.1, from January 8 to 12, 1962.

GEORGE TURTON PLATTS & COMPANY, LIMITED, Sheffield, have asked the Penistone Urban Council about the availability of a site of five to ten acres for a new factory. This would be used for drop-forging work. The Council has appointed a sub-committee to show representatives of the firm around the district.

AN INTERNATIONAL CONFERENCE on the "Metallurgy of Beryllium" is to be held in the assembly hall of the Royal Commonwealth Society, Craven Street, London, W.C.2, from October 16 to 18. It is sponsored by the Institute of Metals, 17, Belgrave Square, London, S.W.1, from whom full details may be obtained.

AN EIGHT-CWT. CASTING struck a man on the neck on August 17 when it slipped from a crane sling in the fitting shop of the Glasgow engineering firm of Melvin & Gillespie, Limited, Charles Street. The man, whose neck was badly cut, is Mr. J. McAllister, engineer's labourer; he was removed to Glasgow Royal Infirmary and detained.

COCHRANE & SONS, LIMITED, shipbuilders, Selby, Yorkshire, have received an order for a deep-water trawler 185-ft. long, from Charlston Smith, Limited, of Hull, one of the Ross group of companies. Had the order not come along there would have had to be a progressive stand-off of workmen. The firm has two smaller trawlers on the stocks.

IN *Newsletter*, No. 13, the National Trades Technical Societies, South Staffordshire section (hon. secretary: D. Payne, 33, Richards Street, Darlaston) and Derby section (hon. secretary: A. E. Benfield, 10, Richmond Avenue, Littleover, Derby), have issued a programme of events for the remainder of this year, which includes several visits to foundries.

PRINCE-SMITH AND STELLS, LIMITED, are to fulfil at their Keighley factory substantial orders for the latest types of drawing, spinning and twisting machinery. The orders are from the wool textile group of Illingworth Morris & Company, Limited, and Salts (Saltaire), Limited, who have embarked upon an extensive plant replacement programme.

THE HYDRAULIC PLANT AND MACHINERY GROUP of the Institution of Mechanical Engineers is planning to hold a conference on "Oil Hydraulic Power Transmission and Control" in the Institution's main meeting hall on November 29 and 30. A registration form to attend the conference is available on application to the secretary of the Institution, 1, Birdcage Walk, Westminster, London, S.W.1.

FAWCETT PRESTON & COMPANY, LIMITED, Bromborough, Cheshire, a member of the Metal Industries group, announce reductions of between 5 and 33 per cent. in the prices of its entire range of Greer-Mercier hydro-pneumatic accumulators and alleviators. The reductions have been made possible by the standardization of the range to 18 models, a move designed to ensure off-the-shelf availability.

KEITH, BLACKMAN, LIMITED, of Tottenham, London, manufacturers of fan-engineering and industrial-gas equipment, have placed a further contract, valued at £45,000, with Hale Construction Company, Limited, for a new heavy fabrication shop and dust research laboratory. A previous contract, nearing completion, was valued at £25,000 and included two new buildings to house both finished goods and raw materials.

THE SIXTEENTH NATIONAL CONFERENCE of the British Institute of Management will be opened in Torquay on October 24 by Mr. S. P. Chambers, chairman, Imperial Chemical Industries, Limited. A European view of British marketing methods, an appraisal of modern industrial relations, the success and failures of a small firm, problems of a large multi-unit organization, management training and research will be amongst the subjects dealt with. The conference closes on October 26.

Mr. ERIC MENSFORTH, chairman of Firth Brown Tools, Limited, reports that the firm has had a year of very full employment and of good orders both for home and export. He says that the business lies in very competitive fields and the company is anxious to train craftsmen and technical and commercial staff. To aid research the firm has created in the Faculty of Engineering at Sheffield University, a "Speedicut" Readership in tool engineering with associated post-graduate scholarships.

THE STEEL COMPANY OF WALES is to start supplying regular shipments of tinplate to the United States of America. During October and November 11,200 tons will be shipped into San Francisco and other ports of the West Coast for delivery to the Continental Can Company and the American Can Company. To conform with the current trend in the United States, the bulk of these orders will be delivered in coil form and

News in Brief

will constitute the biggest output of coiled tinplate hitherto produced by the company.

EXPORT ORDERS for South African iron and steel totalled £4,100,000 for the first half of this year, according to an Iron and Steel Corporation spokesman. The four main buyers were Japan, Britain, Pakistan and Yugoslavia; Japan's orders accounted for over 75 per cent. of the total. Other buyers were: Argentina, Congo, Hong Kong, Italy, Kenya, Korea, the Philippines, Portuguese East Africa, Singapore and Sweden. The exports were made up of 218,000 tons of pig-iron, 15,600 tons of steel products and 1,600 tons of by-products.

HEDIN, LIMITED, of South Woodford, manufacturers of industrial electric-heating equipment, announce that they have taken over additional office and works accommodation at Fowler Road, Hainault, Essex. Manufacture of their industrial heating elements and resistances will continue to be carried out at South Woodford whilst furnaces and ovens will be made at Hainault. Mr. Dennis Hobson has been appointed sales manager of the furnace division; sales of industrial ovens will continue to be handled under the managership of Mr. Peter Keen.

A SHEFFIELD FOOD FIRM is changing over from brass nuts and bolts to stainless-steel ones on its can-filling production lines. The directors ordered the change after the firm, Bachelors Foods, Limited, of Wadsley Bridge, Sheffield, were fined £10 because a brass bolt and washer got into a tin of peas. For the firm, Mr. Ian Harley said that 151,000,000 cans were filled at the Sheffield factory in a year. In the process peas were put into contact with a magnet to remove any possible metal, but brass was not magnetic and had got through. The changeover involves 300 nuts and bolts.

ONE OF THE NEW LEYLAND Power-Plus heavy-goods vehicles is being shown by the company at the International Fair of Techniques and Technical Achievements in Belgrade (August 23 to September 3). The vehicle, a Beaver tractor model with Dyson semi-trailer, powered by a new 200-h.p. Leyland Power-Plus 0.680 diesel engine, features power-assisted steering, clutch and handbrake together with a special version of the "Vista-Vue" cab. The cab, which is long enough to permit a sleeping bunk to be installed across the back of it, has been produced by Bankfield Engineering Company, Limited, of Southport.

NO LESS THAN SEVEN RAILWAY BRIDGES in Barnsley are to disappear because of the streamlining of the town's railway services. The first to go is Eldon Street, where the girders will be removed on August 27—the girders weigh 50 tons each and the total weight of metal in the bridge is about 150 tons. Other bridges to be removed are Queen's Road, Pontefract Road, a bridge between Oakwell Junction and Stairfoot over the River Dearne, and two bridges between Oakwell Junction and Old Oaks Junction. British Railways are also to remove the 700-ton rail-over-rail bridge where the old Courthouse line viaduct crossed over the present line south of Barnsley Station.

IN A JOINT STATEMENT issued by Auto Transmissions, Limited, and Laycock Engineering, Limited, it has been announced that the differences which resulted in legal action and a counter claim have been settled to the satisfaction of both parties. Under the arrangement which has been concluded Auto Transmissions, under whose licence the Laycock de Normanville overdrive is manufactured, will resume responsibility for all matters relating to engineering design and development of this product and other gear units, and they will be conducting direct technical liaison with the vehicle manufacturers. Responsibility for manufacture and for commercial matters remains with Laycock Engineering, Limited.

IF A CONTRACT at present in the negotiating stage with Jugoslavia by a British industrial consortium is successfully completed the Thornaby works of Head Wrightson & Company, Limited, will receive work worth approximately £3,000,000 to £4,000,000. A preliminary agreement between the consortium and the Jugoslavs for a contract has already been reached. This contract covers the building of an integrated steelworks on a new site in Jugoslavia. The annual capacity of the new works will be about 330,000 tons. A senior executive of the Head Wrightson company emphasized that the contract was still at the preliminary stage but he felt if no further hitches occurred during additional negotiations a final agreement could be looked for in the next few months.

THE RECIPROCAL UNEMPLOYMENT INSURANCE AGREEMENT which the United Kingdom concluded with the Federal Republic of Germany on April 20, 1960, has been ratified and will come into force on September 1, 1961. The Agreement covers unemployment benefit provided under the National Insurance Scheme and the corresponding scheme in the Federal Republic. It enables an insured person who becomes unemployed in one country and claims benefit there to count any contributions he has paid in the other country. A separate Agreement covering the other social security benefits of the two countries came into force on August 1, 1961. Those who think they may be affected by either of the Agreements should write to the Ministry of Pensions and National Insurance, Overseas Group, Newcastle upon Tyne.

Obituary

Mr. OLIVER JOHN WOOTTON, who has died aged 84, was the founder some 60 years ago of the engineering and foundry business bearing his name, formerly in Temple Street, Wolverhampton, and now at Wombourne.

The death occurred on August 14 at the age of 66 of Mr. ERIC JEFFERY, deputy works accountant with British Aluminium Company, Limited, Warrington, prior to his retirement in October, 1959. He was with the firm for 40 years.

Recent Wills

BILLINGHAM, J. C., chairman of the Saunders Valve Company, Limited £51,235

WOODCOCK, FRANK, a director of the Helical Bar & Engineering Company, Limited £10,976

WINDLE, E. H., retired foundry foreman, of Brimington, near Chesterfield (Derbyshire) £6,033

SIM, RALPH, of Bramhall (Ches), and a former iron-founder of Heaton Moor, Stockport £36,540

FORSTER, W. H., former director of the Caledon Shipbuilding & Engineering Company, Limited, and a member of the Institute of Engineers and Shipbuilders in Scotland £32,338

ROGER, SIR ALEXANDER, former chairman and first honorary president of British Insulated Callender's Cables, Limited, and a former chairman of the Birmingham Small Arms Company, Limited ... £211,028

Book Reviews

Fehlererscheinungen an Gusstucken, Second Edition (in German) (Occurrence of Defects in Castings), by Dr. Erwin Knipp. Published by Giesserei-Verlag GmbH, Breite Strasse 27, Düsseldorf; price DM 40.

This is the revised and enlarged edition of a book attempting to deal in a fairly comprehensive way with a wide variety of defects in castings of the principal foundry metals. In addition to a preliminary general section on the principles of running and feeding, shrinkage formation, blowholes, slag and sand defects there are specific sections dealing with grey cast iron, malleable cast iron, cast steel, copper-base alloys and light metals.

The author discusses in some detail the principles of the production of sound castings and mechanisms, where understood, of formation of defects. The factors governing the defects and recommendations for their cure are described and frequently illustrated by reference to the foundry literature over many years. This approach has proved to be a formidable task and has not always been wholly successful. The book is therefore necessarily a compromise between an authoritative set of statements and a literature review.

The 340 references draw widely on literature which is mainly German, British and American but in spite of the fact that since the previous edition in 1953 there are an additional 60 references, one could wish for a better coverage of the work of the more recent authors. As a reference work, therefore, it is valuable, though not complete. This is, perhaps, illustrated by the rather poor coverage of the more recent British work on shrinkage and on blowholes in cast iron.

The new edition is about 25 pages longer than the previous one. The increased text is spread uniformly throughout the book which has in many sections been re-written as well as extended. Particular attention has been paid to the inclusion of more recent work on gating and directional solidification and one notes particularly the addition of nomograms for the use of chillers in the making of steel castings, recent work on hot-tearing of steel from American and German sources, data on gating light metals and the relationships between shrinkage and gas in aluminium.

The book should not be regarded as an atlas of defects but rather an extended dissertation on the whole subject of defective castings which contains much valuable information and should prove thought-provoking and helpful to any foundryman capable of overcoming the language problem.

I. C. HUGHES.

Use of Oxygen in the Electrometallurgy of Steel. By G. M. Borodulin. Published by Pergamon Press, Limited, Headington Hill Hall, Oxford; price 50s. net.

This is a useful little book dealing with the practical and economic aspects of oxygen steelmaking in electric-arc furnaces. It is based upon experiences in four steelworks in Russia and is translated by G. F. Modlen and edited by H. T. Protheroe both of the Metallurgy Department of the University of Sheffield. The booklet comprises six chapters of which the first is a general account of the use of oxygen in electric-furnace steel-making while the second deals with techniques specific to various types of steel, *e.g.*, stainless steel, high-speed steel, ball-bearing steels, etc. In these chapters the author says nothing that should not be known by steelmakers in this country and the technique that he describes for the production of 18/8 stainless steel is not, in fact, as good as the best practice in this country. It is, however, the first time that so much practical detail has been published within a single volume and as such it should form a useful guide to newcomers to this field and to students. It would have been of greater use to the latter if more theoretical considerations had also been included. It is unfortunate that there is no reference to the valuable work of Hilty on making stainless steels.

The third chapter deals with the quality of oxygen-lanced steel. This is a valuable summary and presents reasoned arguments in favour of the use of oxygen without any extravagant claims. Here again the author has done all who are interested in this subject a service in dealing collectively with a number of factors to which there are only scattered references in literature previously published.

The fourth chapter is a step-wise consideration of the economics of the use of oxygen. This is very comprehensive and would serve as a useful guide to anyone attempting this sort of exercise.

The fifth and sixth chapters deal with the mechanization of electric-furnace operation and the protection of personnel using oxygen. These chapters contain little that will be novel to the reader in the UK. It is interesting to note that, although reference is made to the problem of fume and dust resulting from oxygen injection, there appears to be no development in Russia of fume-extraction by exhaust ventilation either directly from the furnace shell or by canopies over the furnace. Reference is made only to natural draught systems.

There are a few minor irritations to the reader of which perhaps the most serious is that instead of giving oxygen flow-rates the author refers throughout to the pressure employed. This, of course, tells one nothing except to permit a rough estimate of the flow-rate to be made providing that it is known at one particular pressure for a given installation. The reviewer also regrets the complete lack of reference to any published work carried out outside the USSR, which is a failing common to many Russian texts. On the whole, however, the book can be recommended to all who are interested in foundry steelmaking in electric furnaces. The translation is excellent and it has been accurately and carefully edited.

A. H. SULLY.

Aids to Machine-shop Practice, by C. T. Bower, published by Odhams Press, Limited, 96, Long Acre, London, W.C.2; price 18s.

This book contains some 200 practical hints which for the convenience of the reader have been grouped under 13 heads, *viz.*:—Assembly Methods, Drawing-office Aids, Drilling and Tapping, Gauging and Testing, Grinding Practice, Work Handling, Jigs, Fixtures and Machine Attachments, Lathe Work, Machine-shop Maintenance, Marking Out, Milling Work, Production Methods, Welding Practice.

The book, which is liberally illustrated by line drawings and photographic plates, is not to be regarded as a textbook, but rather as a book of reference for production engineers, shop foremen and machine-tool operators, although, without doubt, many jig and tool draughtsmen will find in the book much of interest particularly in respect of machining methods.

In these days when increased productivity is so vital to the national economy anything likely to lead to improved efficiency is to be welcomed, and this very useful compilation in so convenient a form is therefore to be commended. There can be few firms whose productivity could not be improved by the application of some of these "aids to machine-shop practice."

J. E. GARSIDE.

Publications Received

Annual Report 1960. Published by the *Centre Technique des Industries de la Fonderie*, 12, Avenue Raphael, Paris 16.

The outstanding feature of this annual review is the manner in which it brings out various developments which have been passed over during the year and in this respect it is very valuable. The output of technical literature is so vast that for many busy people it is easy to overlook matters which are personally important. The *Centre Technique* has so many activities in catering for iron, steel, non-ferrous (including die-casting) and vitreous-enamelling technologies that it requires this 100-page brochure briefly to review them. Of all activities reported the one which in the mind of the reviewer is most interesting is the study in progress of literature about feeding-heads and the like, choosing what facts seem to be reliable, analysing them and drawing conclusions of simple character which should be of great benefit to the trade.

In connection with quality labels, it is interesting to learn from the graphs published that the number of French grey-iron founders permitted to use the French equivalent of the British "Kite" mark has steadily increased, whilst the reverse is true of the makers of malleable. Copper-base-alloy founders show an upward curve of quality-label awards but light-alloy founders (who reached a peak in 1959) showed about 7 per cent. decline last year. These curves do show that the granting of a licence to use these quality labels is by no means a permanency.

The success or otherwise of a research association cannot be reduced to figures, but progress is truly depicted in the whole of the French report and not least impressive is the list of new plant installed at Sèvres and other branch establishments.

In covering all activities, each development receives the same attention, a procedure which leaves the reader to ponder upon those which most closely bear upon improvement in his own techniques. This is the first report issued under the *Centre's* new director, Mr. M. Stupfler, and clearly shows that the tempo of activities is being well maintained at the high level one has come to expect.

Suggestions to all Telephone Users in Business Firms. Reprinted from the G.P.O. Handbook.

The mass of suggestions put forward in this booklet are excellent, but some are not economic, such as for instance the one which suggests that would-be callers should look up telephone numbers beforehand, and so leave the operator free for her own particular duty. Another is that a caller shall hold the line in cases of delay. Surely in the case of senior executives, this advice is wasteful of time and money and in any case how many individual offices house complete sets of directories? However, there are set out good hints as to telephoning etiquette. As a firm's telephonist is undoubtedly one of its most important ambassadors, this aid to the smooth running of business telephone use is quite valuable.

Enjoying Retirement, by Dr. Patricia Shaw. Published by the Industrial Welfare Society, Robert Hyde House, Bryanston Square, London, W.1; price 2s. 6d.

The old adage "what is one man's meat is another man's poison," quoted in this book, is typical of the whole question of enjoying life after retirement. Probably finance is the crucial feature, and even this has varying repercussions. Problems of accommodation, health, personal relationships, occupation, etc., are discussed and the author's advice is to attempt to solve them at an early stage. Many of the points made are addressed to people approaching retirement and welfare supervisors also would do well to have this book by them.

Aluminium Courier, No. 54. Published by the Aluminium Development Association, 33, Grosvenor Street, London, W.1, price 2s. 6d.

This issue contains two articles dealing wih foundry practice. The first, well illustrated, starts by outlining the general advantages to be associated with aluminium motorcar-cylinder blocks, and then details some American experiences with them, which culminated in the installation of what is said to be the largest die-casting machine in the world. The first casting produced on this machine was a six-cylinder engine block that had 129 cored holes and weighed only 43 lb.—130 lb. less than a comparable block made in cast iron. Finally the article covers a number of examples of cylinder blocks incorporated in American, English and Italian makes of car.

The second article is devoted to describing and illustrating "Large Aluminium Pressure-die-castings," and in a rather elongated graph is shown how the production of pressure-die-castings in the UK has grown from 2,000 tons in 1946 to 27,000 tons in 1960.

Behaviour of Clay-bonded Sands in a Foundry. Published by the British Cast Iron Research Association, Bordesley Hall, Alvechurch, Birmingham.

The article "Behaviour of Clay-bonded Sands in a Foundry," which appeared in the July issue of the BCIRA *Journal*, has now been issued as a separate card-backed reprint. The article, written by Mr. W. B. Parkes, assistant director, BCIRA, has attracted considerable interest, and those members wishing to receive additional copies for circulation to their foundry personnel are asked to let the Association know how many more are required.

House Organs

Nickel Bulletin, May. Issued by the International Nickel Company (Mond), Limited, Thames House, Millbank, London, S.W.1.

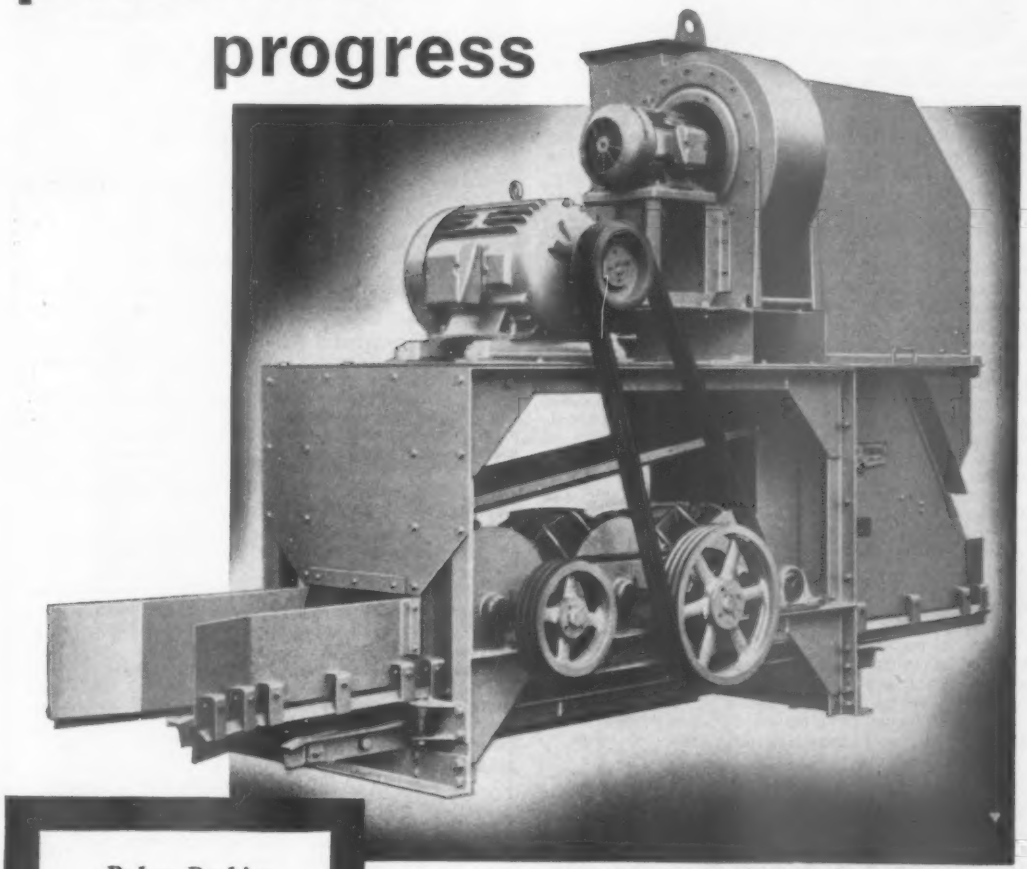
Abstracts of papers presented at the first International Congress on Metallic Corrosion in London in April form an interesting feature of this isuse. Also included are items on the behaviour of nickel/chromium coatings, electrodeposition of nickel-containing alloys, and properties of nickel-containing gunmetals, and a data sheet outlining the properties of a new 18 per cent. nickel-cobalt-molybdenum "mar-ageing" steel, developed by the International Nickel Company, Inc.

The June issue of the *Bulletin* deals *inter alia* with corrosion-resistance of nickel/chromium electrodeposits, double-layer-nickel plating processes, and industrial plating of screws and bolts. The properties and applications of non-ferrous alloys, nickel-iron magnetic alloys and nickel-containing cast irons are also dealt with.

Staveley News, Vol. 10, No. 3. Issued by the Staveley Iron and Chemical Company, Limited, near Chesterfield.

This issue carries an "obituary notice" of the spun-sand pipe foundry which, after 30 years of activity has been closed down. It employed more than 200 people of whom 28 were "founder members." Efforts are being made to find employment for those affected by the shut down. This year, 15 of the apprentices from Staveley and Sheepbridge toured Scottish industrial centres.

pattern for progress



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Raw Material Markets

Iron and Steel

So far there is little sign of any upsurge in demand for castings, the foundries catering for the motor industry and the general engineering and machine tools being the busiest. Most of them are able to maintain a full working week of five days but they are not ordering supplies of pig-iron except on the hand-to-mouth basis as they know full well that the furnaces carry good stocks and they would have ample notice of any shortage developing. There is plenty of pig-iron available for those foundries who use largely hematite, low phosphorus, and refined pigs.

Most of the light foundries using chiefly high phosphorus pig-iron, of which there is sufficient available, are short of work; those producing domestic utensils are badly in need of more business. The light foundries dealing with the building industry are fairly well occupied, though the new Government restrictions make the future far from certain.

The foundries have no difficulty in securing the requisite supplies of scrap, except some of the makers of high duty castings who have special assignments and these special lines of scrap are not at all plentiful. No trouble is being experienced at this juncture in getting the foundries their supplies of foundry coke, ganister, limestone, and firebricks.

There is no change in the position affecting the re-rollers. Most of them are back at work after the holiday recess but at present there is no sign of any upward movement in demand for their products—mainly rounds, and squares, light sections, and strip. Most of the re-rollers would welcome additional orders for current or forward delivery and are also interested in any export business which is available. They have no difficulty in securing all they want in the way of billets. Ordinary mild steel and carbon qualities are freely available, but alloy steels are still subject to some delay in delivery.

No difficulty is experienced by the steelworks in disposing of their arisings in defectives and crops.

Non-ferrous Metals

Increases of £15 10s. a ton for cash and £14 a ton for three months metal brought tin prices within striking distance of the £1,000 mark on the London Metal Exchange at the beginning of the week. Cash tin now shows a gain of about £203 on the year's lowest price, quoted in the early part of January, and it is at its highest level since 1953 when the tin market was under the influence of the US stock-piling campaign.

The normal trend is for demand to fall until the end of August when tinplate mills resume full operations. This year the recovery has been no more pronounced than in any other recent year, but it is coming up against much increased resistance of suppliers to part with their stocks. Supplies of tin from new production still fail to show any response to the high tin prices obtaining since the spring and LME warehouse stocks, which dropped by more than 3,200 tons to 7,020 tons during the second quarter of this year, have since fallen by little more than a further 1,300 tons. The present position indicates that stocks are still firmly held in anticipation of still higher prices.

After several weeks of stability the price of lead has begun to move upwards and at £66 17s. 6d. three months' metal is now standing at about 30s. above the level of 10 days ago. The main cause of the increase is felt by most dealers to be last week's announcement that the US has agreed to buy 90,000 tons of surplus lead from Canada and Australia, the larger deal being with Canada which is to supply 55,000 tons.

The still unresolved Chilean strike situation, together with Central African political considerations are factors contributing towards the steadiness of copper in London. The small drop in London Metal Exchange warehouse stocks last week—the first downturn in four months—probably also helped sentiment.

Much the same position is reported for zinc. Prices are ruling very steady at small gains. In the absence of any worthwhile consumer buying some encouragement may have been derived from the moderate fall last week in LME warehouse stocks.

New Patents

(Copies of complete specifications are obtainable from the Patent Office, Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d.).

849,327. International Minerals and Chemical Corporation, Administrative Centre, Old Orchard Road, City of Stokie, Illinois, USA.

Foundry corebinders, having superior hot properties. They comprise gelatinized amylopectic and a phosphate salt selected from the group—of water-soluble alkali metal and alkali earth-metal phosphates and mixtures thereof which have a pH between about 4 and 7 in saturated aqueous solutions at approximately 25 deg. C.

849,362. Wellman Smith Owen Engineering Corporation, Limited, Parnell House, 25, Wilton Road, London, S.W.1.

Apparatus for the casting of hollow metal ingots intended for use in the production of tubes.

849,373/4. National Lead Company, 111, Broadway, New York, USA.

A method and assemblies for producing die-castings. The co-Patent, 849,374, refers specifically to a disposable sealing member and a method of making it, which may be used in a cold-chamber die-casting assembly.

849,418. British Iron and Steel Research Association, 11, Park Lane, London, W.1, and J. S. Morton, Bridge End, Ockham, near Ripley, Surrey.

Improvements in or relating to the continuous casting of metals (see also B.P. 806,803, JOURNAL, May 21, 1959). Means are provided, according to this present invention, for controlling the supply of fluid, and hence the mould movement in order to release or prevent adherence of the ingot to the mould —which often causes transverse tears in the ingot skin.

Management Planning: Following a preliminary seminar on the "Critical-Path" method of planning and scheduling held in London last June and organized by Industrial Education International, Limited, 66, Chandos Place, London, W.C.2 (management consultants), further seminars have been arranged to take place in London on October 2 and 3 and in Manchester on October 4 and 5. These seminars will again be conducted by Dr. R. L. Martino, president of Mauchly Associates (Canada), Limited, professional consultants on management planning.

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Current Prices of Iron, Steel, and Non-ferrous Metals

(Basis prices, delivered unless otherwise stated. Prices following side headings marked* are subject to an increase of 1 per cent. under Iron and Steel Board Price Determination, 1961, No. 2.)

August 30, 1961

PIG-IRON

* **Foundry Iron.**—No. 3 IRON, CLASS 2, 10-ton lots or over, Middlesbrough, £21 17s. 0d.; Birmingham, £21 9s. 3d.

* **Low-phosphorus Iron.**—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £23 5s. 0d., delivered Birmingham; £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.; North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

* **Hematite.**—Si less than 2 per cent, S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over: N.-E. of England (local iron), £23 19s. 0d.; Scotland (Scotch iron), Zone S.1, £24 5s. 6d.; Sheffield, £25 9s. 0d.; Birmingham, £25 13s. 0d.; South Wales (Welsh iron), £23 19s. 0d.

* **Basic Pig-iron.**—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(per ton unless otherwise stated, delivered)

Ferro-Silicon (6-ton lots and over).—45 per cent. Si, £45 0s. 0d. to £48 0s. 0d., scale 15s. 0d. per unit, lumpy, 75 per cent. Si, £62 0s. 0d. to £66 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 14s.1d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 10s. 3d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 13s. 3d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £81 10s. 0d. to £84 10s. 0d., basis 60per cent. Cr scale 27s. 0d. to 28s. 6d. per unit; over 6 per cent. C, £79 0s. 0d. to £82 10s. 0d., basis 60 per cent. Cr, scale, 27s. 0d. to 28s. 6d. per unit; 2 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 1 per cent. C,* 1s. 8d. to 1s. 11½d. per lb. Cr; 0.15 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr.; 0.10 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.06 per cent. C,* 1s. 11d. to 2s. 1d. per lb. Cr. * Average 68-70 per cent.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £275 0s. 0d.; 96/98 per cent., £285 0s. 0d.

Ferro-columbium.—65/67 per cent. Cb + Ta, 19s. 0d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £58 10s. 0d.

SEMI-FINISHED STEEL

* **Re-rolling Billets, Blooms, and Slabs.**—BASIC: Soft u.t., 100 tons and over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 100 tons and over, £32 5s. 6d.; hard (0.41 to 0.60 per cent. C), 50 tons and over, £33 17s. 0d.; silico-manganese, 50 tons and over, £42 16s. 6d.; free-cutting, 50 tons and over, £35 4s. 6d. SIEMENS MARTIN ACID (50 tons and over): Up to 0.25 per cent. C; £40 11s. 0d.; silico-manganese, £43 4s. 0d.

* **Billets, Blooms, and Slabs for Forging and for Stamping** 50 tons and over).—BASIC: Soft, up to 0.33 per cent. C, £37 0s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £38 2s. 6d.; acid, up to 0.25 per cent. C, £41 14s. 0d.

FINISHED STEEL

* **Heavy Plates and Sections** (50 tons and over).—Ship plate (N.-E. Coast), £40 7s. 0d.; boiler plates (N.-E. Coast), £42 17s. 0d.; floor plates (N.-E. Coast), £41 16s. 0d.; angles (N.-E. Coast), £38 1s. 6d.; joists (N.-E. Coast), £37 17s. 6d.

* **Small Bars, Sheets, etc.**—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 6d.; under 4 tons to 2 tons, £41 3s. 6d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3 mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £67 4s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £67 16s. 0d.; nickel-chrome, £100 18s. 0d.; nickel-chrome-molybdenum, £113 11s. 0d., in lots of 25 tons and over.

NON-FERROUS METALS

Copper.—Cash, £232 5s. 0d. to £232 10s. 0d.; three months, £235 10s. 0d. to £235 15s. 0d.; settlement, £232 10s. 0d.

Copper, Tubes, etc.—Solid-drawn tubes, 2s. 2½d. per lb. rods, 246s. 0d. per cwt. basis; 20 s.w.g., 281s. 0d. per cwt.

Tin.—Cash, £986 0s. 0d. to £987 0s. 0d.; three months £987 0s. 0d. to £988 0s. 0d.; settlement, £987 0s. 0d.

Lead (Refined Pig).—First half September, £65 2s. 6d. to £65 5s. 0d.; first half December, £66 15s. 0d. to £66 17s. 6d settlement, £65 5s. 0d.

Zinc.—First half September, £76 5s. 0d. to £76 7s. 6d.; first half December, £77 0s. 0d. to £77 5s. 0d.; settlement, £76 7s. 6d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £113 0s. 0d.; rolled zinc (boiler plates), all English destinations, £110 15s. 0d.; zinc oxide (Red Seal); d/d buyers' premises, £92 10s. 0d.

Brass Tubes, etc.—Solid-drawn tubes 1s. 9½d. per lb.; sheets to 10 w.g., 198s. 9d. per cwt.; wire, 2s. 8½d.; rolled metal, 198s. 9d. per cwt.

Brass (Brazing).—BS1400, B3, £177; B6, £224.

Brass (High Tensile).—BS1400, HTB1, £195; HTB2, £215; HTB3, £230.

Gunmetal.—BS1400, LG2, £219; LG3, £229; G1, ½% £301; G1, 1%, £291.

Phosphor Bronze.—BS1400, PB1 (AID released), £319; BS1400, 90/10/1, £306.

Leaded Phosphor Bronze.—BS1400, LPB1, £242.

Phosphor Bronze Strip, etc.—Strip, 297s. 3d. per cwt.; wire, 4s. 2d. per lb.; rods, 3s. 5d.; tubes, 3s. 5d.; chill cast bars, solids 3s. 5½d.; cored, 3s. 6½d. (CHARLES CLIFFORD LIMITED).

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 11½d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 4½d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 3½d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 2½d. to 2s. 3d. per lb.; Antimony, English, 99 per cent., £230 0s. 0d. Quicksilver, ex-warehouse, £63 0s. 0d. Nickel, £660 0s. 0d. Aluminium, ingots, £186 0s. 0d.; aluminium bronze (BS1400), AB1, £242; AB2, £251.

Company News

INTERNATIONAL COMBUSTION (HOLDINGS), LIMITED—Interim dividend is maintained at 10 per cent. on increased capital and the directors say that present indications are that profit for the year to September 30, 1961, will be lower than for the previous year, but they hope to recommend payment of the same 30 per cent. total rate of dividend as last year.

COLVILLES, LIMITED, iron and steel manufacturers, of Glasgow—Regarding the issue of 5,324,906 ordinary shares of £1 each at 57s. 6d. per share, about 9,300 acceptances were received from the shareholders of the company for a total of 808,142 ordinary shares and accordingly the underwriters have been called upon to take up the remaining 84.8 per cent. of their commitments.

B. ELLIOTT & COMPANY, LIMITED, machine-tool manufacturers, of London, N.W.10—Net profit for the year to March 31, 1961, rose to £122,508 (£84,217), after heavier tax of £125,302 (£84,676), and final dividend is being maintained at 10 per cent., as forecast, on capital increased by a 50 per cent. scrip issue, representing an effective rise of 3⅓ per cent. The interim on the old capital was unchanged at 7½ per cent.

ALBRIGHT & WILSON, LIMITED, manufacturers of industrial chemicals, of London, S.W.1—Group trading profits, before depreciation, amounted to £4,358,000 in the first half of 1961. Adjusted to include estimated profits of W. J. Bush, Limited, the comparable balance in the six months to June 30, 1960, was £4,419,000. The interim is maintained at 6 per cent. on capital increased by the Bush merger. A total of 20 per cent. was paid for 1960.

STEEL & COMPANY, LIMITED, engineers, contractors, etc., of Sunderland (Co. Durham)—Final dividend of 12½ per cent. is being paid for the year to March 26, 1961, on capital increased by a one-for-six rights issue. The interim, on the old capital, was held at 10 per cent. Group profits have more than recovered the previous year's fall, the balance, before tax, expanding to a record £1,276,471 (£720,627). The net balance attributable to the group has risen to £624,973 (£325,565), after tax of £646,476 (£389,090).

W. G. ALLEN & SONS (TIPTON), LIMITED, colliery, light railway, and mechanical engineers, of Tipton (Staffs)—After a loss of £31,670 in 1959-60, the company reports a net taxed profit of £13,971 for the year ended March 3, and is paying a dividend of 2½ (nil) per cent. An amount of £60,000 has been transferred from general reserve to meet a capital loss on a trade investment. The loss—which has not been included in the year's trading balance but will appear on the balance sheet—refers to a Rhodesian associated company.

WILLIAM JACKS & COMPANY, LIMITED, metal, alloy, and pig-iron merchants, etc., of London, E.C.2—The group's 1960 results were better than those for 1959, turnover increased, and the company's exports rose by £200,000 to £4,667,000. Net profit was £156,233 (£103,523), and the dividend is raised from 6d. to 7½d. per 5s. share. There is again a 2d. per share capital distribution with a one-for-10 scrip issue proposal. The chairman, Mr. W. Gray Buchanan, points out that the scrip issue will increase the issued capital to over £1,000,000 and will make the ordinary shares eligible for trustee investment.

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YOUNG TRAINED MOULDER seeks employment in Foundry of medium importance near London as a floor-moulder. Write to L. SAMLOW, c/o Hauser, Oberburg, Berne, Emmentalstr. 152, Switzerland.

FOUNDRY MANAGER (46), ferrous, non-ferrous and light alloys. Experience in production planning, costing and metallurgy, floor and mechanised. Patternmaker to trade. At present working overseas, on A.I.D. (Approved List). Home address West of Scotland. Box FM928, FOUNDRY TRADE JOURNAL.

METALLURGIST, 43, F.I.M., M.I.B.F., earning £2,000 p.a., seeks executive position with small firm. Wide knowledge and experience of metallurgy of cast iron, iron and steelmaking. Box MF905, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

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A YOUNG, energetic FOUNDRYMAN is required as Junior Foreman in a South of England Iron Foundry. A good basic training is essential and there are excellent prospects for the right man. Apply Box AY912, FOUNDRY TRADE JOURNAL.

EXPERIENCED PROJECT DRAUGHTSMEN required for a Foundry Consultant drawing office in the Epsom area. Mechanical handling experience is essential. Age range 25-35 years. Salary offered commensurate with experience. Apply: PROJECT MANAGER, FOUNDRY MANAGEMENT & DESIGN CO. LTD., 4, Downside, Epsom, Surrey.

MIDLAND Manufacturers of Blackheart and Pearlitic Malleable Iron castings invite enquiries for representation in Scotland. Apply: Box MM918, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMAN. Required for grey iron foundry using green sand and CO$_2$ process for producing plate and cored castings up to 10 cwt.

Good prospects for young man with practical experience and good technical background.

Preference given to applicant possessing National Foundry College Diploma.

Apply PERSONNEL OFFICER, THOMAS PORTERTON, LIMITED, (Member of De La Rue Group), Emscote Road, Warwick.

PROGRESSIVE Investment Casting Company in the United States of America requires EXPERIENCED PROCESS ENGINEER. Applicant should have experience in gating, casting and ceramic shell techniques, salary commensurate with qualifications and experience. Reply stating age, qualifications and experience to Box P1921, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*contd.*

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Applications are invited for the position of Senior Methods Engineer with a leading South Wales Steel Foundry. This position calls for a detailed knowledge of methods along with the ability to discuss design problems with customers. A knowledge of piecework, rate-fixing and estimating would be advantageous. The Company operates a Staff Superannuation Scheme. This is a staff appointment. The salary will depend upon age and experience. Replies, which will be treated in confidence, and which should give full details of age, experience and qualifications, to the Works Manager, Brown, Lennox & Co. Limited, Pontypridd, Glamorgan.

FOUNDRY METALLURGIST, experience in malleable and grey iron, furnace and sand control. Must have good foundry experience and take charge laboratory. Situate West Midland area. Box FM903, FOUNDRY TRADE JOURNAL.

ASSISTANT FOREMAN for Grey Iron Foundry in Birmingham Area on jobbing and batch production up to 20 cwts. Experience on Sand Control and modern foundry procedure. Position offers excellent prospects to young man possessing drive and initiative. Box AF914, FOUNDRY TRADE JOURNAL.

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AN experienced man is required for an Aluminium Foundry. Must be fully conversant with Sand, Gravity Die and Pressure Die Castings, and have an extensive knowledge of the industry. To be fully responsible to the Directors for the Commercial Management of the company. Send full details of past experience and salaries earned to: Managing Director, Box CM919, FOUNDRY TRADE JOURNAL.

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HAND MOULDERS required, preferably with steel foundry experience on medium weight castings. Regular employment with overtime. Bonus payed. JOHN FOWLER & CO. (LEEDS), LTD., Sprotborough Steel Foundry, Doncaster.

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A New Zealand Engineering Company (an associate of a well known English Company) REQUIRES a young FOUNDRY TECHNICIAN who should possess a good basic knowledge of Pattern and Runner systems design blended with practical foundry experience in production methods (light iron castings). Another important requisite is that the individual is a person of character, who can pull his weight in a team. The main attraction of this appointment is the opportunity it presents in the future. Salary will be a matter for discussion at the interview which will take place in Yorkshire. Applicants should state details of age, experience, domestic status, etc., and address their applications to Box NZ925, FOUNDRY TRADE JOURNAL.

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AGENCY wanted for various areas for Steel Castings, etc. by a Company with considerable existing connection and a sales organisation throughout Great Britain. Replies to Box AW215, FOUNDRY TRADE JOURNAL.

PATENTS

THE Proprietors of Patent No. 732814 for "Improvements in or relating to Regenerative Furnaces" desire to secure commercial exploitation by Licence or otherwise in the United Kingdom. Replies to Haseltine Lake & Co., 28, Southampton Buildings, Chancery Lane, London, W.C.2.

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OLD ESTABLISHED IRONFOUNDRY for sale with staff of 10 skilled men and equipment to tackle floor moulded castings up to 10 tons. Good order book and plenty or room for expansion. West Riding of Yorkshire. Apply Box OE927, FOUNDRY TRADE JOURNAL.

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WANTED. Two Cupola Furnaces, approximately 5 ft. or 6 ft. outside dia. Preferably with spark arrestor, fan, motors and starters. Please state full particulars Messrs. J. C. Hulse & Co. Ltd., Hinkshay Road, Dawley, Shropshire.

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Four—Temperature Control Panels, each panel fitted three edgeways temperature indicators, and one combined indicator and recorder. Range: Zero/750 deg. C. and Zero/1,000 deg. C.
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For further details apply:—Cox & Danks Limited, Park Royal Road, London, N.W.10. Tel.: Elgar 5811, or any of the following branches:—Manchester, Tel.: PENdleton 2481; Sheffield 344391; Birmingham, Broadwell 1611; Bedford 67331.

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ONE Contractors' Hand Operated 3F Diaphragm Pump, mounted on Hand Trolley.
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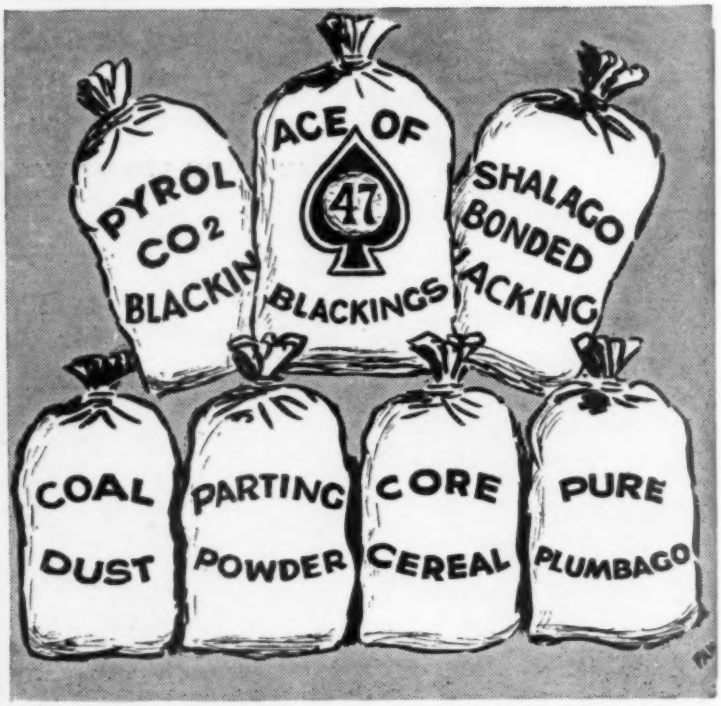

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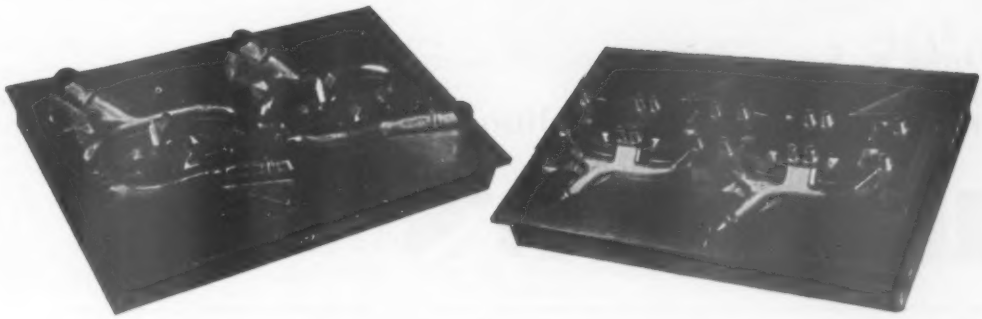

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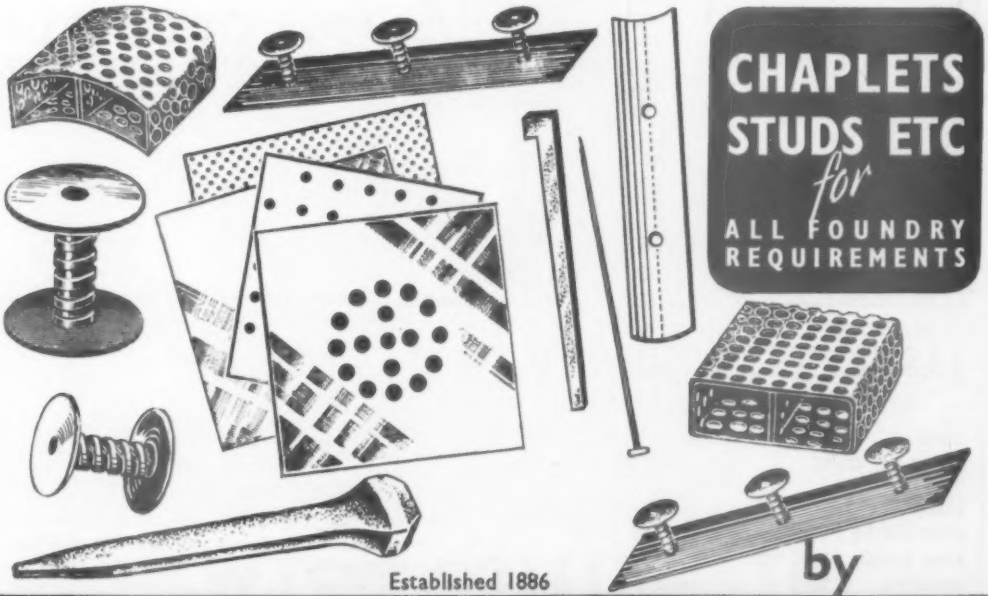

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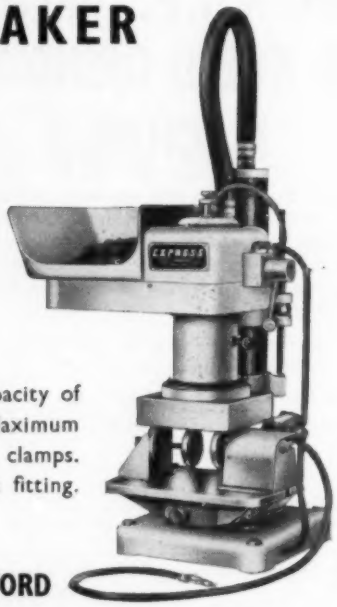

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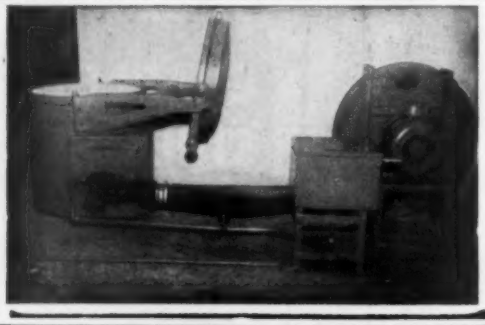

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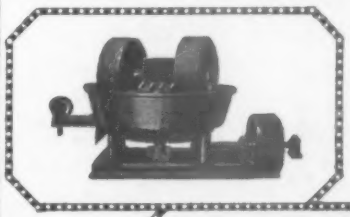
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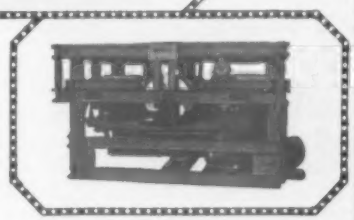
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